

MRT

MOBILE RADIO TECHNOLOGY

Technical information on private wireless, trunked and public safety networks.

AUGUST 1999

**Mobile Radio Technology
spotlight on public safety**

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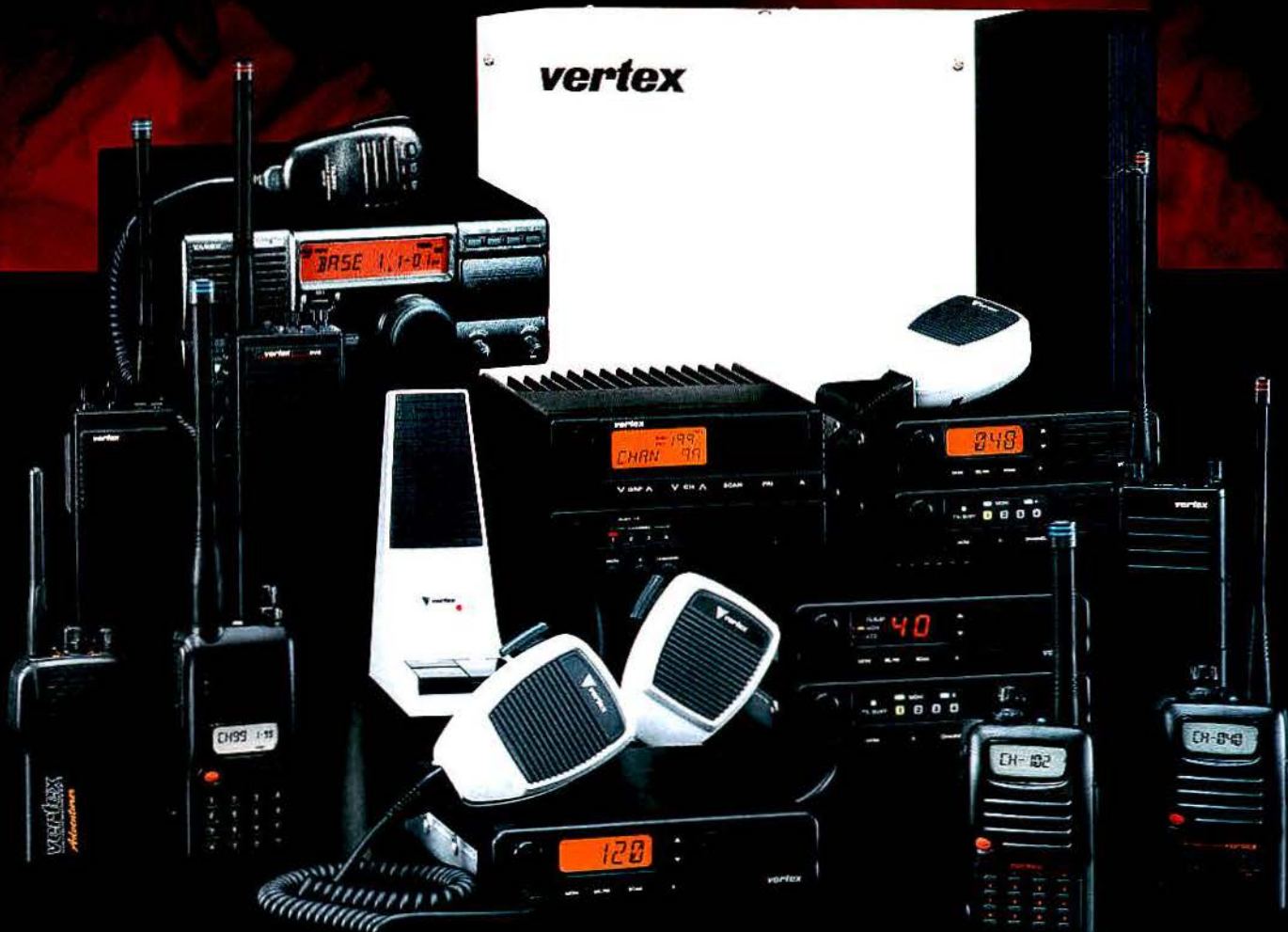
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August 1999



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Cover design by Scott Dolash, art director. Photography by Donald E. Koehler.

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3 Great Products

for *Public Safety*



TOWER-MOUNTED PREAMPLIFIER

The new 423-Series brings economy with uncompromised performance to TX RX Systems' family of dependable tower-mounted preamplifiers. Model 423-86A-01-03 is designed specifically for use with Public Safety frequencies in the NPSPAC band.

Model 423-86A-01-03

Pass Bandwidth: 821-824 MHz

Isolation @ 825 MHz: 35 dB

Gain: 14-15 dB

System Noise Figure: 3.0 dB

3rd O.I.P.: +40 dBm

Weight: 22 lbs.

DUPLEXER

Vari-Notch[®], the trademark for TX RX Systems' pseudo bandpass circuit design, offers the best cost-to-performance ratio in its class. Model 28-37-02A has been around for nearly 20 years. Its sound design, rugged construction, and long-term dependability make it an excellent choice for Public Safety applications.

Model 28-37-02A

Frequency Range: 144-174 MHz

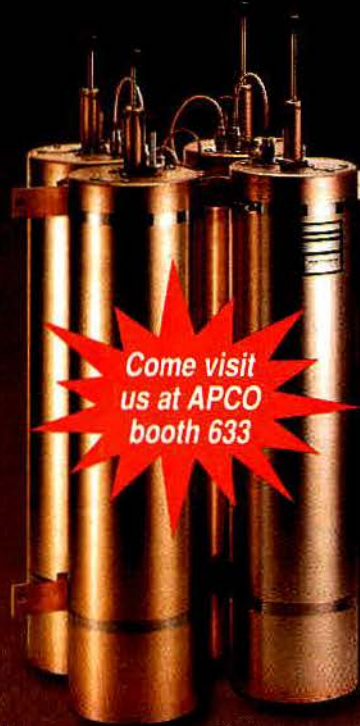
Min. Freq Separation: 500 kHz

Insertion Loss: 1.5 dB

Isolation: 85 dB

Max. Power: 400 Watts

Applications



REPEATER AMPLIFIER (aka Signal Booster)

These amplifiers are used to extend radio coverage into areas such as convention centers, prisons, shopping centers, subways, and airports. Models are available with various gains, pass bandwidths, enclosures, supervisory and backup features. Model 61-89A-06-OLC-G2 is a popular choice for use in the NPSPAC BAND.

Model 61-89A-06-OLC-G2

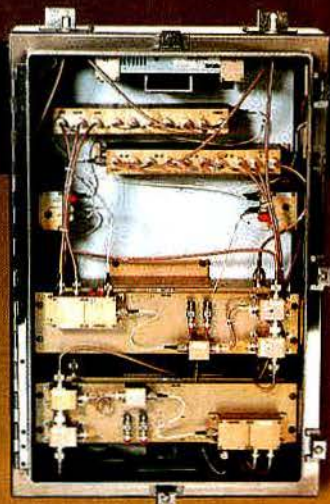
Pass Bands: 821-824 & 866-869 MHz

Gain: +83 dB (typical)

3rd O.I.P.: +44 dBm (typical)

Output Level Control: 35-40 dB

Enclosure Type: Stainless Steel NEMA 4X



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Scanning . . .

Mobile data: 'about to explode'

The FCC's Fourth Annual Report on the State of Wireless Competition was adopted on June 10 and will be submitted to Congress. The report said that mobile data was in a developmental stage. Without a doubt, mobile data has made some strides during the past 15 years. (See page 48) Even so, it never became as pervasive, nor has it supplanted voice communications, to the extent that its proponents envisioned those many years ago. In fact, those who said it was "about to explode" continue to be right. The only question is, when, exactly, is detonation day? Or, using the lexicon of the most recent couple of years, what is the "killer app"? Internet access? Could be. Microsoft and Nextel think so.

Wireless telephony, including cellular, PCS and Nextel, continues to be healthy, the report explains. The 35 largest Basic Trading Areas now have at least five wireless telephone providers. The price of mobile telephone service is falling.

Paging, or messaging, whichever that industry segment calls itself these days, grew subscriber totals only a few percent during the past year, compared to some heady years of 40% growth. It's getting tougher for paging companies to compete with wireless telephone. But with 50 million or more subscribers, they have a long way to fall.

The FCC found that traditional dispatch continued to grow during the past year. The auctions it conducted in for 220MHz and upper 800MHz band frequencies may provide new competition in the traditional dispatch market, the agency's report said. Are you part of that growth?

* * *

Centralized trunking rules

For private land mobile radio, good news sometimes is defined as the lifting of a small uncertainty, and little more than that. More spectrum? Rescinding a licensing freeze? Exemption from auctions? That would be expecting too much. No, the best that can be hoped for sometimes is a small step forward, such as an FCC action on June 10, adopting new rules to facilitate "centralized" trunking on frequencies below 800MHz.

"Decentralized" trunking, which amounts to little more than a mobile operator monitoring several channels and picking an open one, has been working

fairly well already. Electronic controllers and software do the monitoring and channel selecting automatically.

"Centralized" trunking puts the channel selection control at the repeater site and does not monitor to avoid interference with ongoing communications. As a result, it requires exclusive, rather than shared, frequencies. If other users already were on a channel proposed for trunking, then their consent was required. Under the previous rules, if a circle with a 70-mile radius from the proposed trunked station intersected the coverage contour



of another station, consent from that station licensee was required. Under the new rules, consent is required only if the interference contour of the proposed station intersects the coverage contour of another station.

With some proposed stations using limited power and antenna height, the interference contour may extend considerably less than 70 miles. The change will make it easier to coordinate trunking in such cases.

Frequency coordinators have been given authority to place a 60-day hold on conflicting applications when a trunking applicant is in the process of obtaining consent. This step can help to prevent "strike" applications, which are applications filed by sneaky competitors only to block the efforts of a bona fide applicant.

These rule changes are positive for private land mobile radio. They lift an uncertainty, and they make it possible for at least a modest expansion of centralized trunking below 800MHz.

Get ready for another uncertainty, though. The FCC may address decentralized trunking before much longer.

* * *

Hello ... and goodbye

We say hello to Ramona Isbell, *MRT's* new executive editor. She comes to us from *Wireless Technology International* magazine. Not that she was all that far away to begin with. Her office is next to mine. You see, she already was part of Mercy's group of magazines. (Lots of people know Mercy, but if you don't, she's our group publisher.) Ramona came to our group several years ago as editor of *WTI*. That magazine is being absorbed by *Global Telephony*, which made Ramona available to us. I'm delighted to say that she accepted our invitation to be part of the *MRT* and *RFD* editorial team. No one at Intertec Publishing is a more capable editor than Ramona. If we have to, we'll run a contest to find out. But I'd rather you take my word for it. Ramona played a key role in building *WTI's* popularity with readers around the world, and we're always looking for ways to improve *MRT*, too. Having Ramona's leadership will be an advantage.

With this issue, we have to say goodbye to Emily Reid. She has been an editorial assistant with *MRT* and *RF Design* since last summer, after graduating from the University of Kansas. To say that we have been impressed with her journalism skills and initiative would be an understatement. Emily, by the way, wrote the commentary about Project 25 that stimulated so much discussion in our letters column and on our Web site. She's returning to KU to study law. I figure she'll take over Robert Schwaninger's column some day. I have a day in mind. But don't tell Robert. He's so sensitive, y' know.

* * *

Tower available

Reader Mark Sardaro's non-profit group wants to get rid of a commercial cell tower "in exchange for a donation." For details, write: PARA, P.O. Box 954, Valley Forge, PA 19482-0954.

* * *

Back issues

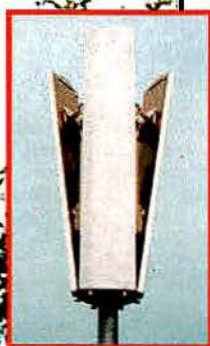
Reader Tim Anderson called to say he has years of back issues; "pretty complete" from the mid-80s to 1999. If you would like to have some or all of them, please call him at 605-745-3103.

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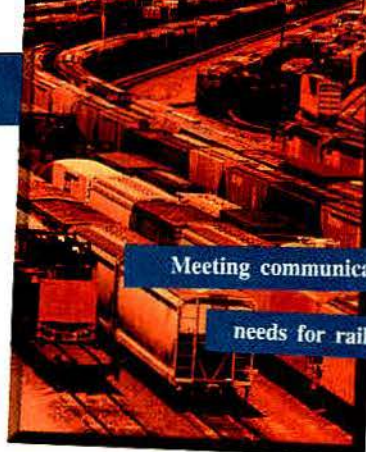
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FEATURES AND NEWS: Railroad communications; the changing face of paging.

PLUS: Robert H. Schwaninger Jr.'s "In the Public Interest"; Don Bishop's editorial; "Editorial Forum" by Nikki Chandler; "Product Focus": pagers.

AND IN THE MONTHS TO COME: System upgrades; location technologies; test equipment; hand-held radios focus; benchtop focus; Buyers' Guide.



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needs for railroads



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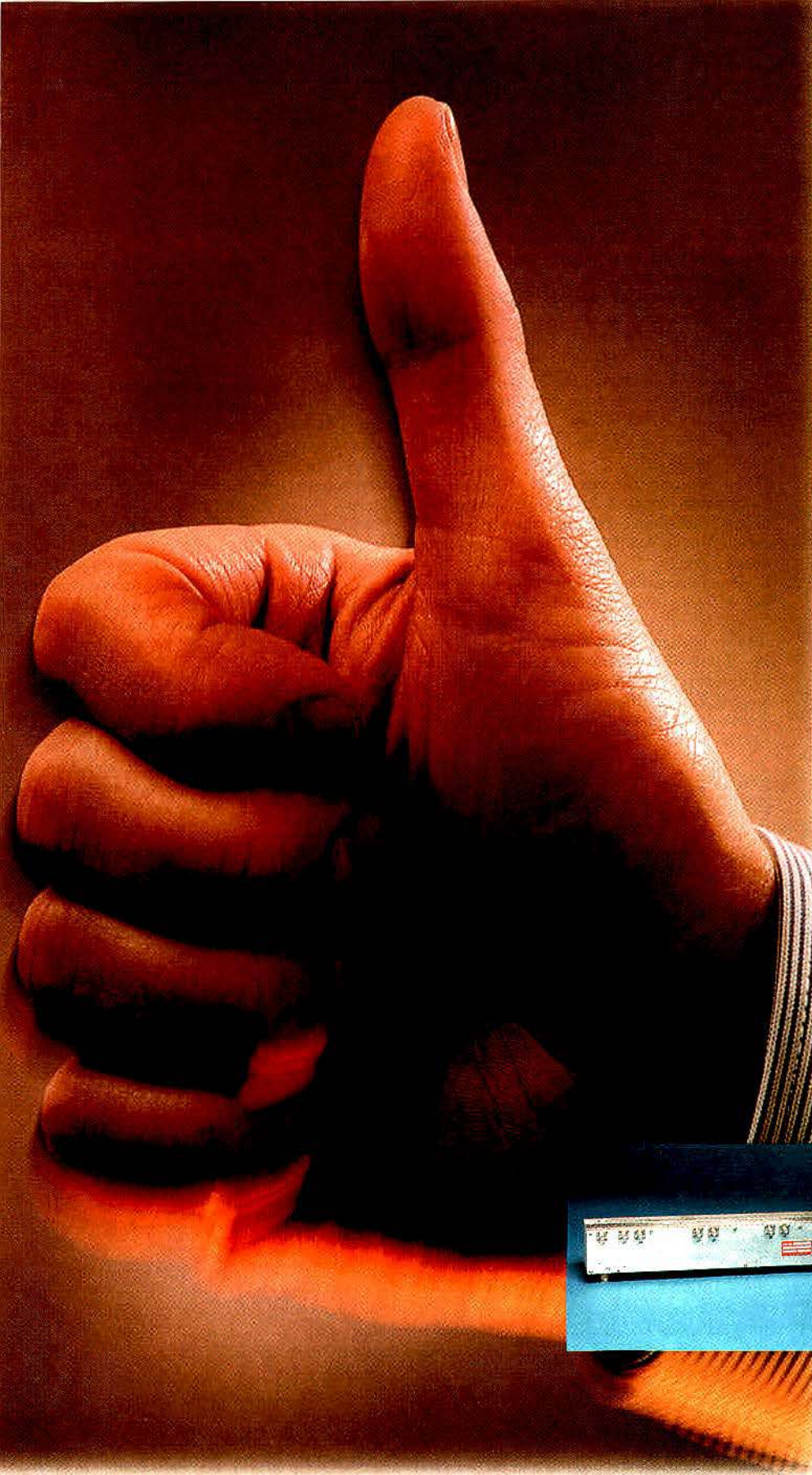
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August

8-12—Association of Public-Safety Communications Officials—International (APCO) National Conference, Minneapolis. Contact: 904-322-2500 or Web site www.apcointl.org.

September

19-22—Fall Vehicular Technology Conference, sponsored by IEEE Vehicular Technology Society, Amsterdam, The Netherlands. Contact: 904-322-2500.

23-25—Personal Communication Showcase, sponsored by Personal Communications Industry Association, New Orleans. Contact: 703-739-0300 or Web site www.pcs99.com.

October

14-15—Small Business in Telecommunications National Conference, Regal River Front Hotel and Convention Center, St. Louis. Contact: 520-423-2205.

18-21—Annual APCO Canada Conference, sponsored by APCO, New Brunswick Canada. Contact: Jim Flanagan at 888-CANAPCO.

25-26—Annual Telecom Summit, sponsored by The Strategis Group, Hyatt Regency Gainey Ranch, Scottsdale, AZ. Contact: 202-530-7602.

27-30—Industrial Telecommunication Association/USMSS joint Conference, sponsored by ITA and USMSS, Grand Hyatt, Washington. Contact: 703-528-5115 or Web site www.usmss.com/Meetings/meeting.htm.

November

1-4—Telecommunications Resellers Association Fall Conference and Exposition, sponsored by TRA, Dallas. Contact: 202-835-9898 or Web site www.tra.org.

2-4—Wireless I.T., sponsored by the Cellular

Telecommunications Industry Association, Santa Clara Convention Center, Silicon Valley, CA. Contact: 202-785-2842 or Web site www.wow-com.com.

8-9—Entelec & UTC Joint Fall Seminar, JW Marriott, Houston. Contact: 888-503-8700 or email entelec@pdq.net.

10-14—Communications Marketing Conference, sponsored by the Communications Marketing Association, Harvey Hotel, Dallas. Contact: Jack Armstrong, 410-628-9300.

15-16—AMTEX, sponsored by the American Mobile Telecommunications Association, Hilton, Walt Disney World Village, Lake Buena Vista, FL. Contact: 202-331-7773 or Web site www.amtex.org.au.

15-16—Fourth International Congress on Commercial Trunked Radio, sponsored by the International Mobile Telecommunications Association, Hilton, Walt Disney World Village, Lake Buena Vista, FL. Contact: 202-331-7773.

17-19—TelecomLatina, co-sponsored by *Mobile Radio Technology*, Miami Beach Convention Center, Miami. Contact: 800-288-8606 or Web site www.telecomlatina.com.

19—Radio Club of America Communications Symposium, 91st Anniversary Dinner and Awards Presentation, New York Athletic Club, New York. Contact: Gerri Hopkins, 732-842-5070.

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February

28-March 1—Wireless 2000, sponsored by the Cellular Telecommunications Industry Association, Ernest Morial Convention Center, New Orleans. Contact: 202-785-0081 or Web site www.wow-com.com.

March

19-22—ENTELEC 2000, sponsored by ENTELEC, Dallas Convention Center, Dallas. Contact: 281-357-8700 or Web site www.entelec.org.

22-24—International Wireless Communications Expo, co-sponsored by *Mobile Radio Technology*, Las Vegas Convention Center, Las Vegas. Contact: 800-288-8606.

May

8-11—Telecommunications Resellers Association Spring Conference and Exposition, Philadelphia Marriott. Contact: 202-835-9898 or Web site www.tra.org.

15-18—Spring Vehicular Technology Conference, sponsored by IEEE Vehicular Technology Society, Tokyo Pacific Hotel, Tokyo. Contact: 904-322-2500 or email matumoto@mars.yrp.nttdocomo.co.jp.

30-June 1—Canadian Wireless, sponsored by the Canadian Wireless Telecommunications Association, Toronto, Canada. Contact: 613-233-4888, ext 102, or Web site www.cwta.ca.

June

4-8—Supercomm, sponsored by TIA and USTA, Georgia World Congress Center, Atlanta. Contact: 800-278-7372.

25-29—UTC Telecom, sponsored by UTC, The Telecommunications Organization, Phoenix. Contact: 202-857-1881 or Web site www.utc.org.

August

13-17—Association of Public-Safety Communications Officials—International (APCO) National Conference, Boston. Contact: 904-322-2500 or Web site www.apcointl.org.

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Hot topics in public safety for August

It's August, and that means it's time for APCO. Having just gotten through with NENA, public safety is on everyone's brain. Here is my list of "hot topics" in public safety right now, gathered from what I've heard from *MRT* readers, what I've read on the side and what I've heard out on the show floor:

□ **Y2K:** If you're not ready to go now, you're in deep trouble. Even if you think you are ready, you're still in trouble, just not as much. Something is bound to go wrong.

The key concept here is "*continuity plans*." Make sure your agency has them. Oh, and make sure you keep your fingers crossed that the power will work ...

□ **E911/W911:** The show floor at NENA was covered with location software. It's out there. It's ready to go. Now all the public safety agencies have to do is pick out one that they like the best. (And, of course, figure out how to pay for it) ...

□ **Project 25:** Has anything developed since I last visited this topic? Should we think about leaning more toward TETRA? (I know many people think so.) It is a *real* multisource solution; the equipment is already on the market and functioning in Europe; and it is less expensive than its American counterpart ...

□ **Spectrum auctions:** Many smaller entities can't use the spectrum they have been assigned and are being directed to compete in the auctions with the big guys, which doesn't accomplish anything other than wasting huge amounts of taxpayer money ...

□ **Interference:** This is not just a public safety problem. This is everyone's headache, and the world is still waiting for a good solution. If someone could actually find one—and there has to be one out there somewhere—it could be an extremely profitable venture ...

Many of your lists will vary from mine. This is just some food for thought as you head up to the Northland for the APCO national conference. (Check out the pre-show coverage later in the issue.) I, however, will not be attending the conference. I am leaving *MRT* to pursue a career in communications law, and I start school this fall. I have enjoyed my time working in this industry. It has taught me a great deal, not only about trunking, private wireless, public safety communications, and things of that nature, but also about being a journalist. Thank you for supporting (and opposing) my opinions on the workings of this industry. Either way, it was always good to hear from you.

...I wonder if I'll qualify for a subscription to *MRT* now?

—Emily Reid

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Investigating interference

I wanted to send you my thoughts on your "Editorial Forum" in the May 1999 *MRT* ("Cooperate to Combat Interference").

For the last 20 years, I have been involved in various radio things in downstate New York. I started with a scanner and earned an amateur radio license, then a general radio telephone license. I became an officer at a Long Island ARC

and became an emergency communications preparedness volunteer for the town of Huntington and Suffolk county on Long Island.

I was involved in several interference investigations in the Long Island area. Most of what I did was run down deliberate jamming on some ham repeaters. I caught four people in the act with mobile direction-finding methods.

I also stumbled on to several interest-

ing things, including an informal pirate network. There were a number of stations sharing a frequency of 91.9 each weekend. When I investigated this, I found out that one was the *builder*, and the others were people who purchased his old units. They would time-share the frequency on weekends when a high school further out on Long Island went off the air.

There were also people who were deliberately destructive. When I got a feel for someone jamming a ham channel, I would eventually develop information on other bad habits. These same people would modify their radios to annoy police or fire channels and harass marine or CB users.

We had people try to hack our repeater controllers late at night, sending touch-tones and trying to take control away from control operators. There really are people without a social life outside of radio. These same people would go after commercial units if ours would not respond.

Once I was asked to look into people fooling around with remote control radio stuff for LILCO (Long Island Lighting Company). I was told that these remote controls ran high-voltage distribution and switching gear. Not smart.

About the only thing that would get the FCC out of bed is people fooling with air-traffic-control channels. They did take someone down near JFK airport some years ago. Otherwise, we didn't count on them to *do* anything about our problem operators.

In an ideal world, we should all get along and do wonderful things. In the real world of New York two-way, it's not pretty. What I've just told you is the tip of the iceberg.

—Michael F. Chisena
Herndon, VA

In-depth and technical

Just a few words to tell you that you guys are doing a fantastic job.

Of all the trade magazines I read, yours is by far the one I prefer. Why? Because you are not scared to go in-depth with technical subjects. Thank you for giving us (the readers) the credit of being able to understand complex technical subjects. Keep up the variety (RF, fiber optics, telco lines, etc). *MRT* is also a great source of new products information.

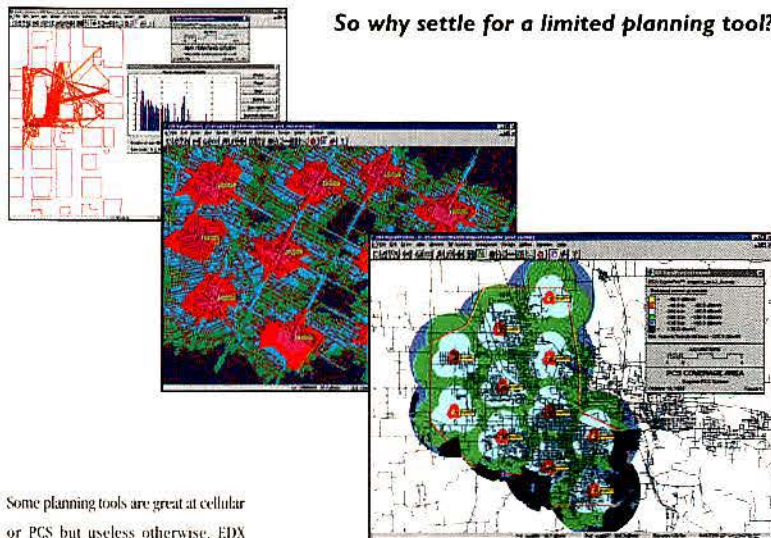
Best regards to *MRT* staff,

—Dave Parcigneau, Montreal,
Quebec, Canada
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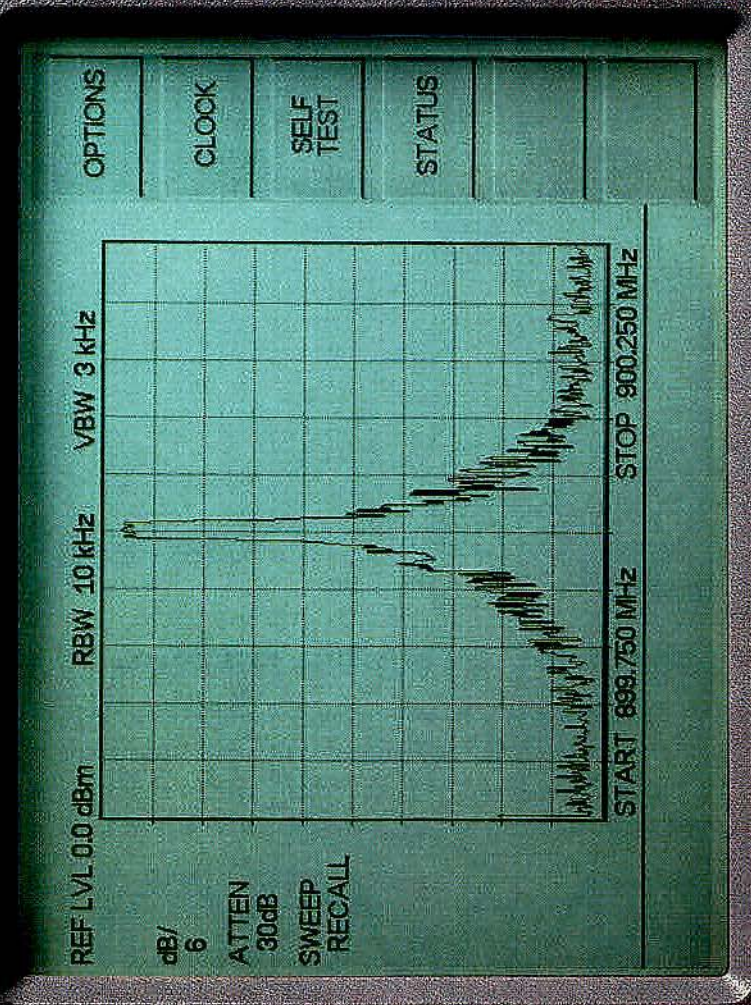
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MODE	FREQ / SPAN	AMPLITUDE	BW / SWEEP
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Thunderdome: '... two men enter, one man leaves ...'

By Robert H. Schwaninger Jr.

Welcome to the FCC's version of Bartertown, the mythical desert city where iron-cage matches to the death are sport for the amusement of Master Blaster and his followers. You can hear Tina Turner growling out the theme song as operators step into the electronic cage, ready to go one-on-one in an interference death match. The gladiators raise their antennas, sharpen their power amplifiers and begin in one continuous wave of disaster after another.

Although harmful interference is the oldest problem in all telecommunications (and the reason the FCC was created), many recent forms of interference have a new twist to them. The FCC has, in essence, permitted the creation of the interference. The FCC is aware of the consequences and yet has done nothing to curtail the problem or even to lessen its harm to operators.

Like Thunderdome, the blood lust is without allegiance to either combatant. Rather, the FCC would have the combatants battle it out, while it enjoys the fray without shouting encouragement to either side. You can't tell if the agency has a champion in these battles. You can only note the absence of a referee.

HDTV channel 14

The proposal to operate HDTV chan-

Schwaninger, *MRT's* regulatory consultant, is the principal in the law firm of Schwaninger & Associates, Washington, DC, which is counsel to Small Business in Telecommunications. Schwaninger is also a member of the Radio Club of America.

nel 14 in those 20 or so cities where it has been authorized continues, even though the FCC is fully aware that once these zilla-watt stations are fired up, they will wipe out land mobile operations on dozens of UHF frequencies. Picture your UHF receivers trying to do

duce interference at an unprecedented level. Manufacturers and the operators of television broadcast stations also admit that no technical solution exists. At this time, no one has found a way to filter the anticipated HDTV channel 14 signal to the extent necessary to protect adjacent-channel operators.

Despite this expected tidal wave of electronic noise, the FCC has not even placed a single digit in the dam. When contacted by an RCC operator, (who expects to have insurmountable levels of interference) asking what steps might be taken prior to the commencement of the problem, an FCC employee staid that the operator was out of luck. The Office of Engineering and Technology staff member told the operator, "You had a chance to make comment in the rulemaking. Now it's too late."

Speaking as a lawyer, that is hogwash. The OET staffer's claim is not legally correct. The RCC operator had no obligation to comment that the FCC's allocation of HDTV channels would wipe out his business. His business is already protected under law, under the FCC rules and under the HDTV licensee's authoriza-

tion, which does not provide authority for operation of adjacent-channel spurious emissions.

Globally positioned interference

If you have been receiving interfering data signals on your UHF community repeater or PCP two-way system, there is a strong chance that the source of the interference is Global Positioning System (GPS) equipment using your channel for error correction. That's right.

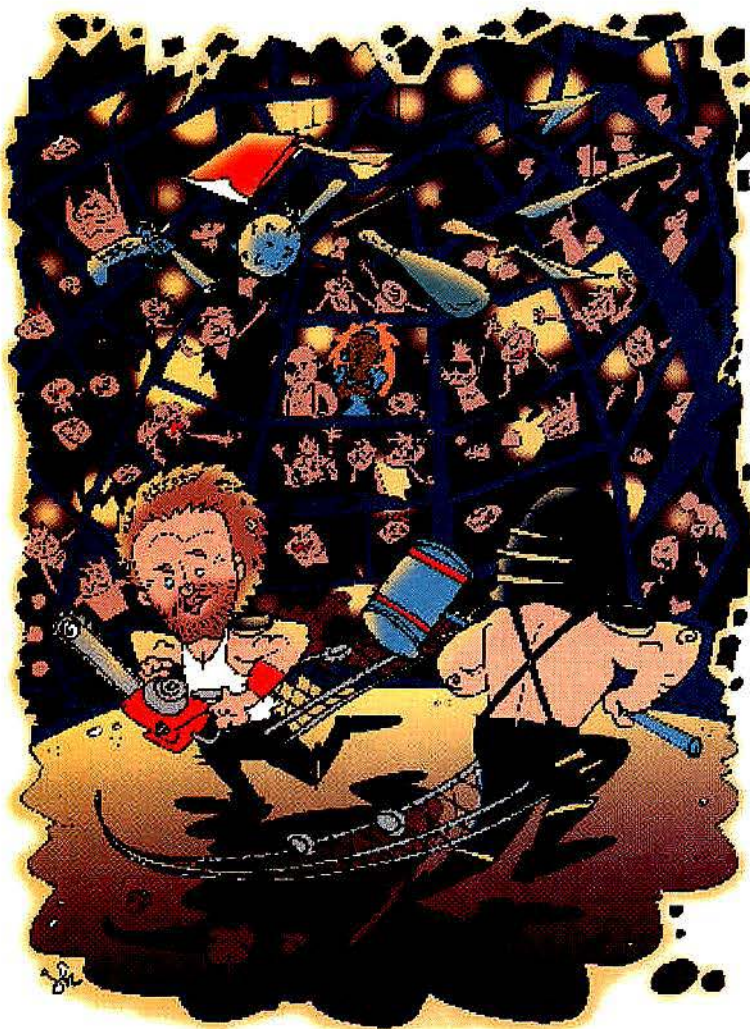


Illustration by John Hayes

battle with these transmitters. The FCC has authorized digital operations on channel 14, presuming publicly that the signal will magically remain contained within its designated bandwidth. But the expert agency is too smart to believe its public posture.

The HDTV square-wave digital signal will produce substantial adjacent-channel noise that will overwhelm that portion of the UHF band where CMRS receivers operate. That noise will pro-

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Circle (9) on Fast Fact Card

Some non-caring manufacturer has put GPS equipment onto the market that sends continuous streams of data across private radio channels for operation of remote GPS transceivers.

These systems are being hawked by the manufacturer as an aid to surveying, automatic vehicle location, and other coordinate-sensitive operations. The problem is that the use of the channels is not in compliance with the FCC rules regarding shared operations.

For example, the GPS operator usually does not monitor the channel before coming up. Therefore, the data stream just wipes out the UHF channel—and keeps it wiped out for hours on end. In fact, most of the operators don't even know that they are supposed to monitor, or how such monitoring might be accomplished, when all they are armed with is GPS equipment.

Again, the FCC has been informed about the use of the GPS systems, but we still have not seen a Public Notice that warns consumers of GPS equipment that such use is in violation of the rules. If the community repeater operator can actually track down the user, the private radio operator is having a tough time getting the user to understand that the system is being used illegally. After all, the GPS operator has a license. But what the GPS operator is lacking is a copy of the FCC rules that state that simply having a license isn't enough. You have to operate your equipment properly as well.

Narrow escapes

Check the refarming docket and the rules that have been adopted thus far to move the industry to narrowband channels. See if you notice an overlapping development from wideband to narrowband. You will.

The FCC has not mandated that operators on primary channels narrow their use. They have also allowed operators on offset frequencies to increase power and height. They have authorized VHF systems to operate on 6.25kHz equipment, even though such equipment doesn't exist. Meanwhile, the date for timely construction of some narrow VHF systems is running out.

The effect is an electronic battlefield in the market where new operators are banging against long existing systems; trunked systems are banging against older community repeaters; and the en-

tire use of the private UHF and VHF bands is in flux. It is as though the agency has decided to let the blood flow and they will come in later to count the bodies, laud the living and tax the survivors.

The FCC has not been good at figuring out logical methods of narrowband transition that would avoid making billions of dollars in equipment obsolete. I can give them one hint. The nomination of a "band manager" ain't the answer.

The solutions

For HDTV channel 14, the FCC needs to admit the problem and act *now* to accommodate the competing uses of the band. If the original allocation of the HDTV spectrum won't work, the FCC needs to make necessary changes in the allocation to avoid the carnage in lost UHF land mobile communications.

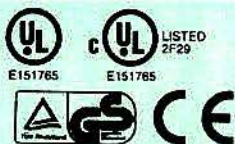
For the GPS system, the FCC either needs to set aside the equipment authorization given to the manufacturer of these systems for failure to produce a device that can, in fact, produce necessary channel monitoring, or it needs to direct manufacturers to include a warning in their sales literature that unauthorized use of the devices will result in fines. Also, the FCC should produce the long-awaited Public Notice to arm private radio operators when they go to see errant operators.

For refarming, the FCC needs to assist with logical transitions. When narrowband operations are authorized, but the equipment isn't being made, the FCC should provide some relief to licensees in the form of extended construction periods, etc. When primary users are being bombarded by new narrowband operations, the FCC should check to make sure the new kid is running legitimate traffic. All operators should try working together to assist in a logical, peaceful transition, rather than making life harder.

Out of chaos

No one can logically expect the FCC to be able to foresee or cure every possible source of harmful interference. But when the agency is aware of the problem, or is, indeed, the *creator* of the problem, we can expect that the outcome will be something more civilized than a battle between Mad Max and The Humongous. Perhaps the FCC should request another Tina Turner song, like "Private Dancer." ■

The FCC rules state that simply having a license isn't enough. You have to operate your equipment properly.



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Circle (10) on Fast Fact Card

Anchorage International

*In a disaster, people and equipment have to come together.
Agencies serving the Anchorage area.*

by Donald E. Koehler

Recently the Anchorage International Airport (AIA) conducted its tri-annual, FAA-mandated, mass-casualty exercise. James Michangelo, operations officer for the airport, was the key player in setting up and running this successful exercise. Michangelo, who has worked on the National Transportation Safety Board (NTSB) investigations team, ensured realism and depth in the exercise this year.

Players from the municipality of Anchorage and military fire departments participated. Area medical facilities were included to test response plans for their facilities. The local Amateur Radio community provided exercise communication, with some 40 hams present with their radio gear, including Amateur Position Reporting System (APRS) equipment that allowed exercise evaluators to track ambulance location and status.

AIA has been using VHF frequencies for ground operations, such as fire and safety. The VHF system meets their day-to-day needs, but in certain situations, as pointed out by this drill, it can be difficult to communicate with the large emergency services management infrastructure in the nearby community. The municipality has a trunked 800MHz Motorola system, which has the features and performance to please emergency service

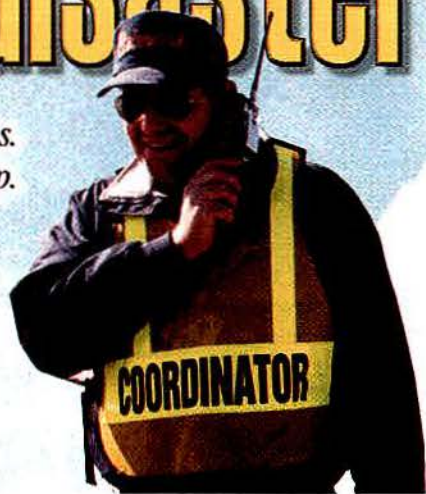
Contributing editor Koehler has more than 30 years' experience in radio, telephony and computer electronics. He has been teaching part-time at the University of Alaska, Anchorage, AK, for the last four years. He is also a certified disaster recovery planner.

His email address is afdek1@uaa.alaska.edu.



Airport drills for disaster

her in an efficient recovery and triage process, all linked by mobile communications. Anchorage airport recently prepared for that unwanted day when it's not all just makeup.



Top: Radios in each truck assist with directing water to the correct spot. **Above:** Firefighter aids "crash victim." Portable radio keeps her in touch with aid station. **Above right:** A firefighter is suited up and ready to roll.

providers. Meanwhile, the airport fire department is currently forced to carry two radio sets (VHF and 800MHz). A request for quotation

(RFQ) will be issued shortly that will move the airport from its current VHF system to one compatible with the municipality's 800MHz trunked sys-

tem. This seamless communications system will enhance an already excellent response system for Anchorage's citizens and visitors. AIA's existing VHF frequencies were a legacy from the state of Alaska, which had been planning to construct a VHF trunking system and never completed the project. Now all agencies servicing the airport will be interoperable, and managers will only need to carry one "brick."

The Anchorage community supports and participates in this type of training. Anchorage school children volunteered as "victims" for the disaster exercise, while the local Red Cross chapter transported food and water donated by the business community. The Alaskan Air Guard provided a C-130 aircraft for firefighters



Left: Until a new trunking system is installed, managers use multiple radios. **Below left:** Hand-holds are essential to firefighters, and accessories make them more efficient. **Above:** Drills often have to occur during active operations.



to simulate entry for casualty search and firefighting. The airport responded with its HAZMAT trailer system, disaster victim assistance trailer and the full range of firefighting equipment from the airport station. Local hospitals participated as well.

Anchorage, known as the "Air Crossroads" of North America, has an airport that handles 30% more air cargo flights than any other airport in the world. Flights across the North Pacific count on the emergency services in Anchorage should an incident occur.

In 1997, an Air China flight experienced an in-flight event that resulted in many passenger injuries. After the plane landed at AIA, victims were transported to area hospitals so efficiently that the local consulate sent letters of recognition to the Anchorage emergency services management team.

Mass-casualty exercises provide the kind of training and experience to permit this efficiency. A well-trained community communications infrastructure is one of the keys to a well-run emergency response. ■

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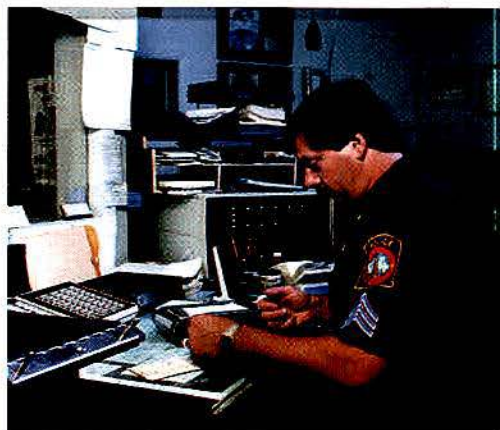
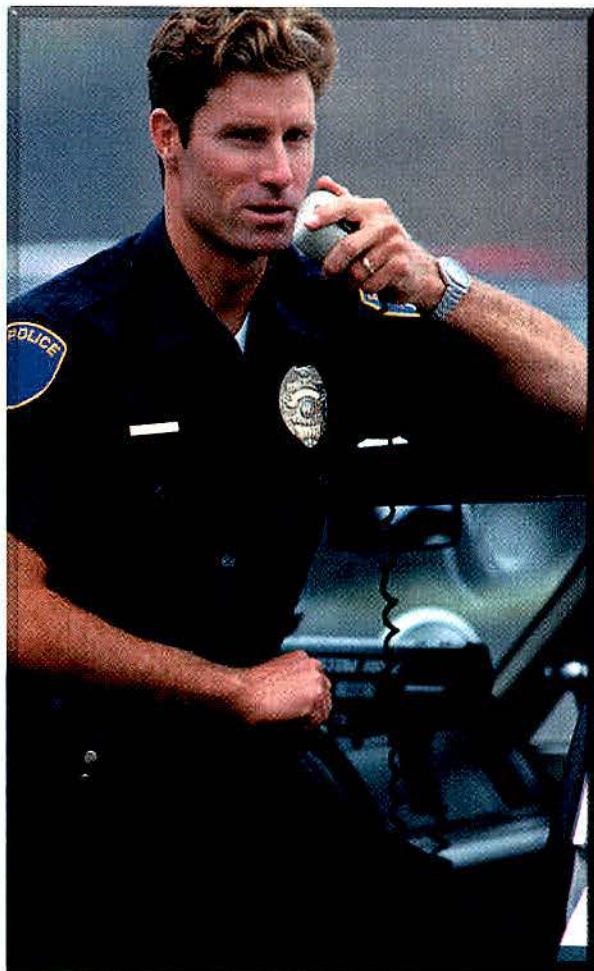
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Words do count

Public safety agencies faced with purchasing a new telecommunications system need to consider contracts, competitive negotiation and due diligence. Recent experience in procuring a system for the Connecticut Department of Public Safety illustrates these points.



inquired about the irony of a vendor discarding the answers that won them a place at the negotiating table. The sales representative, in an ill-considered statement, told us: "They're just meaningless words; don't worry about it. We'll get the job done." On this verbal "non-commitment" rested the fate of a more than \$36 million contract for an 800MHz trunked digital simulcast radio system.

If your RFP is a clear document, vendors should be able to respond in a detailed and specific way to the requirements of the client agency. Do not accept form responses or sales puffery. Vendors will attempt to impress you with glossy marketing brochures containing vague and generic responses. Those brochures should not form an acceptable basis for evaluation and must be discouraged at the outset of the procurement process.

Lesson #2: Control contract drafts

If you are merely purchasing equipment, a "form contract" offered by the vendor may be the way to go (but read it carefully). If the vendor is providing system integration, *insist* on negotiating a contract from the bottom up. Create your own contract blueprint:

By Steven G. Mednick
and Lt. Col. Matthew Tyszka

In the darkest hour of the longest day of a nine-month negotiation, the following exchange underscored the importance of preparation and sticking to your guns in a substantial public safety telecommunications procurement. During an impasse on the issue of coverage testing for co-channel interference, the client, the state of Connecticut, proposed using verbatim language from the vendor's response to the request for proposal (RFP). Curiously, the vendor rejected its own words. Incredulous, the state

Lesson #1: Creating the words

In a public procurement, the words begin to flow in the RFP. Without a clear RFP, the agency purchasing the system would be at the mercy of the vendor. This is especially true in an integrated telecommunications systems market where a limited number of vendors respond to RFPs. As a result, the RFP must be crafted in a manner that binds the vendor to the words contained in its proposal. The RFP should delineate *mandatory* and *optional* system requirements, laying out technical issues and objectives in a comprehensible manner for the vendors.

Mednick is a partner in the Connecticut-based law firm of Carmody & Torrance, LLP. He was retained by the state of Connecticut to oversee the entire process and handle the final negotiations for the state procurement of an 800MHz trunked digital simulcast voice and mobile data system.

Tyszka, Connecticut State Police (retired) and an APCO member, was in charge of coordinating the development of the RFP for the system and was involved in all aspects of the procurement and negotiation process. He is currently a consultant to the Connecticut Department of Public Safety to continue the implementation and testing phases for the new system and holds FCC General Radiotelephone and Amateur Radio Extra Class licenses.

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- ❑ Issue mandatory contractual requirements in your RFP (i.e., indemnification, copyright and patent protection, and software escrow requirements) that will be included in the final contract.
- ❑ Pay careful attention to warranty provisions proposed by vendors. (See "Lesson #10," page 30.)
- ❑ List the RFP requirements in a comprehensive "representations and warranties" provision.
- ❑ Be sure "due diligence" burdens fall to the vendor or system integrator.
- ❑ Include all necessary technical documentation.

In the end, do not rely on the raw words of the RFP and the technical responses as your system blueprint. Take those words and create a *technical exhibit* attached to the contract.

Lesson #3: Adhere to the process

Connecticut's experience demonstrates the importance of paying attention to the procedural, legal and regulatory issues posed by the rambling and evolving competitive negotiation procurement process. This multitiered process began in August 1996, ended in March 1999 and included six stages:

- ❑ issuance of the RFP.
- ❑ vendor selection evaluation.
- ❑ drafting a "vendor selection report."
- ❑ authorization to commence contract negotiations with the vendor.
- ❑ contract negotiations.
- ❑ publication of an award report.

At the risk of oversimplification, the keys to the early phases of the competitive negotiation are: (1) to establish protocols for a thorough review of vendor proposals, with an eye toward narrowing the gap between the RFP requirements and the responses; (2) advising the prospective vendors of the statutory and regulatory requirements of the competitive negotiation process and inviting inquiries regarding any perceived ambiguities in the process; and (3) holding the successful vendor to the words used in its responses. Bear in mind that post-selection litigation is driven not by the substance of the technology but rather by any deficiencies in following the established procurement procedures.

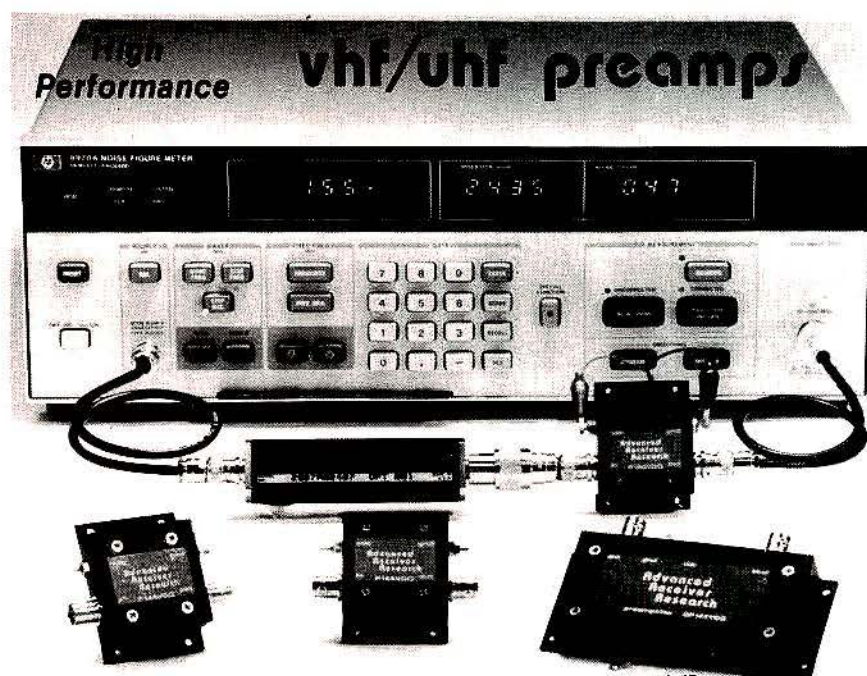
Lesson #4: Procedural clarity

In addition to *substantive* clarity, efforts should be made to ensure that your procurement is not vulnerable to *procedural* attack.

First, define and reinforce the procedural requirements of the competitive negotiation process. Communicate and correspond with the vendors to increase their understanding of the requirements of the process and the *rules* governing the process. Have them ratify the process by soliciting criticism before taking any subsequent steps.

Second, establish clear and verifiable evaluation criteria. The evaluation team decision must be justified legally and technically. The team must establish scoring criteria and apply the standards equally to all vendors.

Third, control the competitive negotiation process. Issuance of the RFP is the *beginning*, not the end, of the procurement process. Use the evaluation process to better understand the proposals and to clarify ambiguities that may exist in your system requirements—before getting to the negotiation stage.



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P30VDG, P35VDG, P40VDG, P45VDG	30-35, 35-40, 40-45, 45-50	<0.5	26	+12	GaAsFET	\$109.95
P150VD, P160VD, P170VD	150-160, 160-170, 170-180	<1.5	15	0	DGFET	\$ 44.95
P150VDA, P160VDA, P170VDA	150-160, 160-170, 170-180	<1.1	15	0	DGFET	\$ 56.95
P150VDG, P160VDG, P170VDG	150-160, 160-170, 170-180	<0.5	24	+12	GaAsFET	\$109.95
P450VD, P460VD	450-460, 460-470	<1.8	15	-20	Bipolar	\$ 49.95
P450VDA, P460VDA	450-460, 460-470	<1.2	16	-20	Bipolar	\$ 74.95
P450VDG, P460VDG	450-460, 460-470	<0.5	16	+12	GaAsFET	\$109.95
P800VDG, P830VDG, P860VDG	800-830, 830-860, 860-890	<0.6	19	+12	GaAsFET	\$119.95

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	Freq. Ranges (MHz)	N.F. (dB)	Gain (dB)	Comp. (dBm)	Device Type	Price
SP30VD, SP35VD, SP40VD, SP45VD	30-35, 35-40, 40-45, 45-50	<1.4	15	0	DGFET	\$ 74.95
SP30VDG, SP35VDG, SP40VDG, SP45VDG	30-35, 35-40, 40-45, 45-50	<0.55	26	+12	GaAsFET	\$139.95
SP150VD, SP160VD, SP170VD	150-160, 160-170, 170-180	<1.6	15	0	DGFET	\$ 74.95
SP150VDA, SP160VDA, SP170VDA	150-160, 160-170, 170-180	<1.2	15	0	DGFET	\$ 86.95
SP150VDG, SP160VDG, SP170VDG	150-160, 160-170, 170-180	<0.55	24	+12	GaAsFET	\$139.95
SP450VD, SP460VD	450-460, 460-470	<1.9	15	-20	Bipolar	\$ 79.95
SP450VDA, SP460VDA	450-460, 460-470	<1.3	16	-20	Bipolar	\$104.95
SP450VDG, SP460VDG	450-460, 460-470	<0.55	16	+12	GaAsFET	\$139.95

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Power (watts)	5	5	5	5
Channels	256	255	255	256

	Racal 25	Competitor A	Competitor B	Competitor C
Metal Case	Yes	No	No	No
Submersible	2 Meters	No	No	No
Keypad Programming	Yes	No	No	Yes
Battery Meter	Yes	No	No	No

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Lesson #5: Negotiator expertise

Remember that vendors put their best face forward through their sales force. They will often hire lobbyists or well-connected lawyers to scope out the situation and your budget in advance. In one case, this resulted in achieving a low bid price but missing the mark on the principal, substantive requirements of the RFP. When negotiating with the vendors, insist on having their technical personnel at the table. Do your homework, and hold the vendor to the *words* they used to get to the table in the first place.

Lesson #6: Due diligence

Issuing the RFP should be the first step toward shifting the burden to the vendor. In the beginning, the client agency knows what its functional requirements and needs are; however, when your RFP hits the street, you have a right and an expectation that knowledgeable vendors will respond with the best technology available to meet your public service requirements. Set the goals and provide the criteria for reaching your objectives. Make it a clear requirement that you expect the vendors to inform you of deficiencies in your re-

quirements, assumptions or technology, and ask them to come up with a better way to meet the goals. Be sure to require the vendor to estimate costs for correcting any such deficiencies they identify.

On a legal and technical level, coverage requirements illustrate the previous point. If you require digital voice coverage of 98% of the total land mass of your area in all seasonal conditions at a bit-error rate (BER) of not more than 2.6%, this should be clearly articulated in the RFP and mandated throughout the entire process.

For example, Connecticut's RFP and, ultimately, the contract, required the vendor to agree that, during testing, if 98% of the area is not covered, "... (it) will make all necessary adjustments to achieve the 98% coverage level on a troop-by-troop basis ... (with the exception of Troop L)" Moreover, the contract provided that should any other site be needed to guarantee 98% coverage, the vendor would be responsible for obtaining the necessary permits and any other approvals required for site development.

Lesson #7: Shift the design burden

Hand in hand with due diligence is the requirement for the vendor to design the system. Again, in Connecticut, the coverage and other operational requirements of the system were derived from the vendor's design and installation of the system. The state required that the prospective vendors use the existing state-owned microwave network, including, but not limited to, sites and current FCC-licensed frequencies, and to notify the state of any weaknesses or deficiencies in our infrastructure.

The vendor locked itself into this obligation when it stated in its proposal: "The sites that are used in our baseline offering are the existing state-designated sites. We will be able to meet the state's coverage requirements using existing towers and microwave equipment." These *words* are meaningful because any changes or modifications of the infrastructure necessary to achieve the objectives of the contract will fall to the vendor.

Lesson #8: The system integrator

If the vendor is obligated to design, implement and maintain a statewide telecommunications system, it is vital to make it clarify that the procurement is not solely for the purchase of equipment, products or components. Accordingly, the RFP and contract should be replete with clearly delineated responsibilities and obligations of the vendor as

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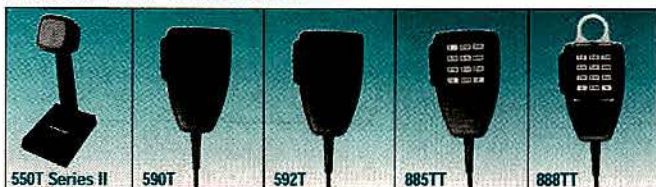
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a system integrator. As such, the vendor is required to:

- ❑ provide and install the latest version of proven hardware and software necessary to create the new system.
- ❑ ensure all aspects of system design and correct any defects to the system or make any modifications of the design at its sole cost and expense.
- ❑ construct and install any towers, shelters or renovate any facilities if necessary to comply with the performance and acceptance test plan requirements of the contract.

Lesson #9: Create a system test

The vendor, after completing system installation and before final acceptance of each phase by your agency, should perform integration tests, functional and operational tests, and coverage verification *under your supervision*. All the elements of the system must be immediately functional and demonstrable to the satisfaction of your agency, subject to a percentage-of-payment "holdback" prior to final payment and transfer of title to your agency.

Lesson #10: Beware of warranties

One of the challenges of negotiation is the tension that exists between customer and vendor perceptions relating to warranties. The procuring agency wants a wide net for warranty services, while the vendor will propose a list of service exclusions. Yet the quality of warranty and maintenance requirements are crucial issues in the procurement. Under the terms of the Connecticut contract, these services are seamless from the initial installation period through any future extended warranty and maintenance periods. With the exception of the annual maintenance payment that will commence following the end of the warranty term, there will be no distinction between the quality and service levels offered. The contract clearly delineates the service and maintenance obligations.

Serving the public trust

A public entity must take the procurement process seriously from the date the RFP is drafted to the time when the contract is signed. Vigilance requires internal discipline, strict requirements for vendors to abide by and *accountability*. The costs of these contracts are too high, and the public safety services provided by communication systems are too critical, to ignore. From the beginning to the end, it all comes down to *words*—formulated in the RFP, contained in vendor responses and "clearly" articulated in the contract. ■

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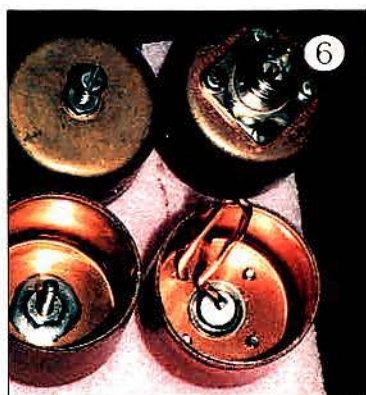
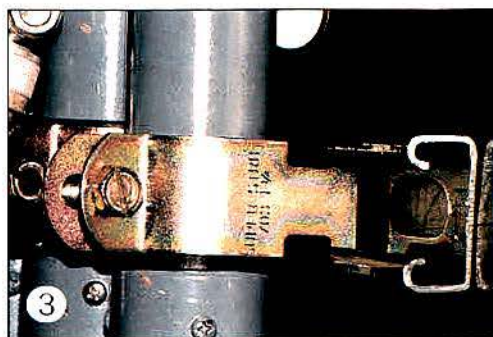
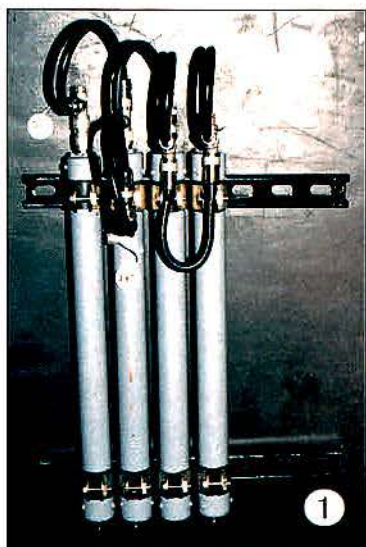
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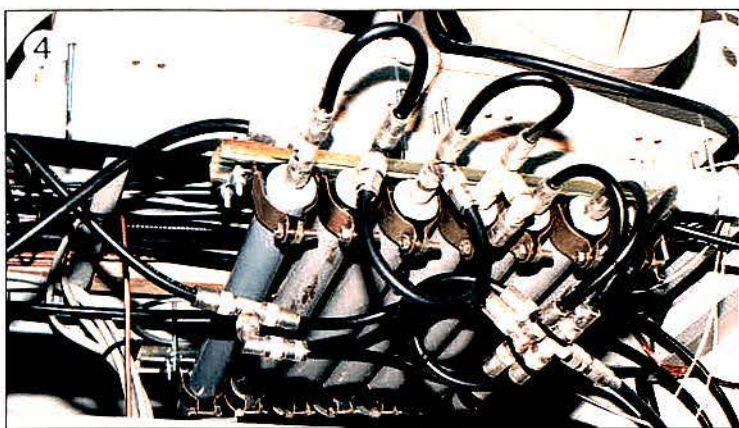
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Custom-fabricated VHF cavity filters. Clockwise: (1) a cavity duplexer arrangement; (2) link side and tuning side of cavity [center insulator for $\frac{3}{8}$ -inch pipe not installed]; (3) pipe strap attachment on strut channel; (4) three-way duplexer [three transceivers connected to one antenna]; (5) assembled cavity with black shrink tube; (6) both sides of pipe caps, link and tuning.



Make VHF cavities from over-the-counter hardware

Fabricating simple cavities may seem like work, but space, cost, flexibility and ease of tuning make the concept an attractive alternative.

By Patrick E. Buller

Often a situation arises where an expensive VHF cavity is not only big and bulky, but it also can result in more insertion loss than necessary. An economical approach is to fabricate smaller cavities from readily available materials. The experience can be rewarding and recreational.

The operation of most VHF-UHF cavities is based on the *quarterwave*

Buller is an electronics design engineer for the Washington State Patrol, Bellevue, WA. He is also a member of IEEE, NARTE, RCA, APCO, ARRL.

theory, where one end of a conductor is grounded, leaving the other end at a high-impedance (voltage) point. Minimum insertion loss is one of the goals for both *notch* and *pass* cavities. Notch and pass cavities differ only in the manner in which energy is inserted and removed. Pass cavities have two connections, one for the insertion of power, and the other to remove power at the tuned frequency. The pass cavity, when used as a notch cavity, will have one unused loop or port. A pass cavity can simultaneously operate as a notch cavity if its loop is tuned with a capacitor to a notch frequency and the pass cavity

is left tuned to the pass frequency. Notch cavities have one coaxial connection to remove energy at the tuned frequency. This discussion will be limited to the notch feature. Using large (4- to 10-inch) pass cavities for notch applications is an excellent approach, but it's overkill for wide frequency separation.

Q value

The term "Q" is a dimensionless value defining a "quality of merit" of tuned circuits. For a cavity, Q is a measurement of its narrow bandwidth of either pass or notch capabilities. A value of Q_u (unloaded Q) is directly

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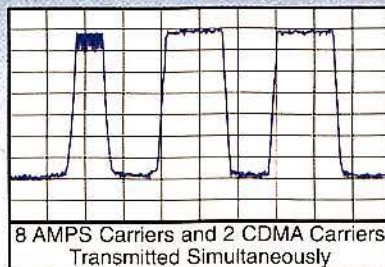
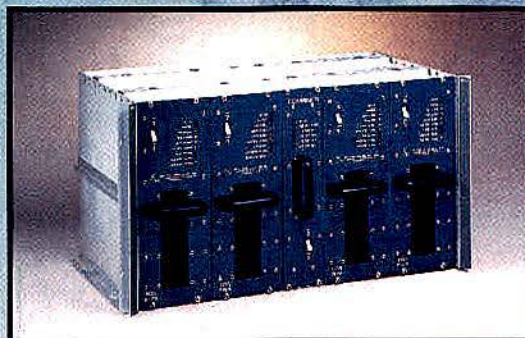


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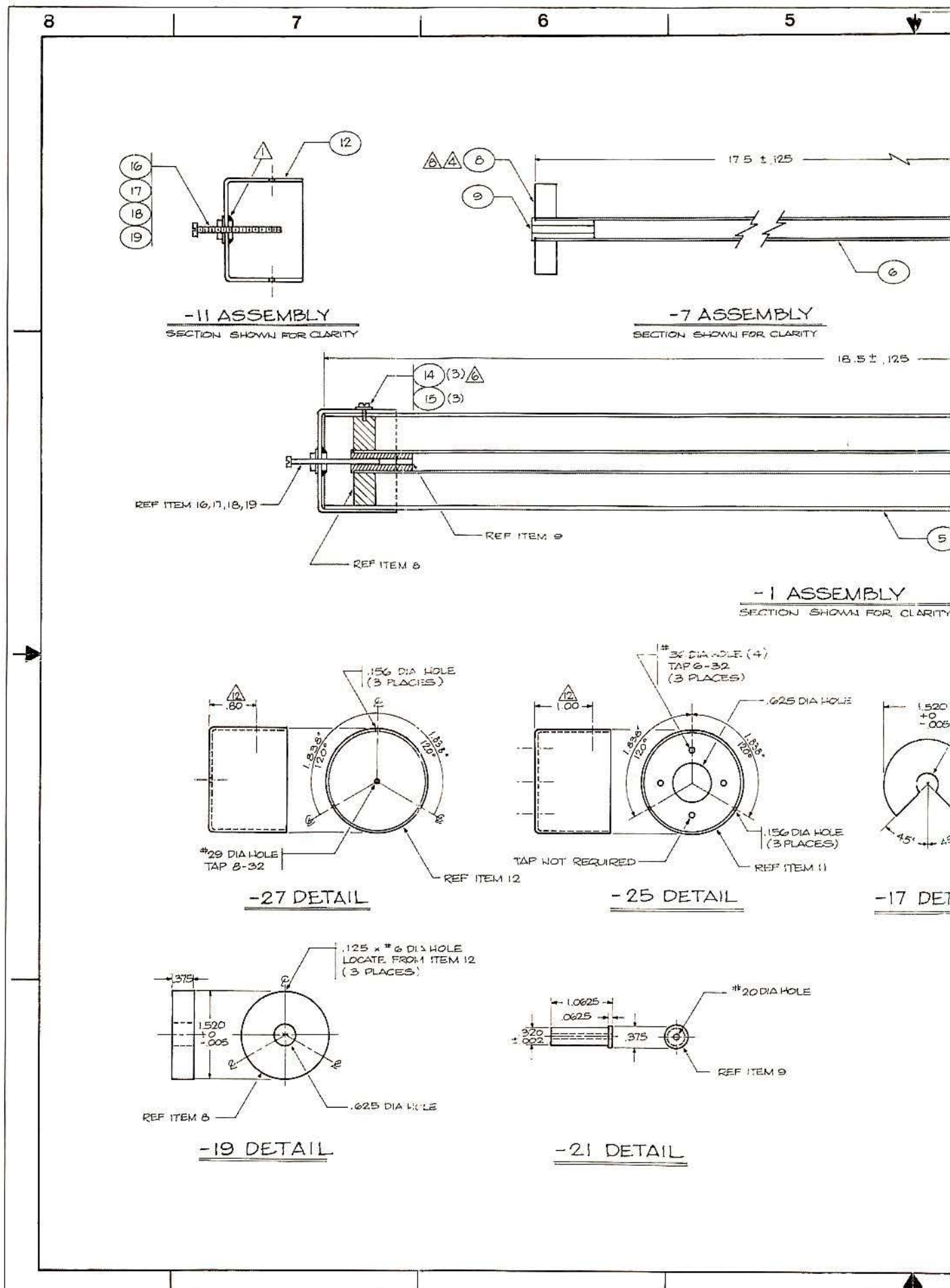
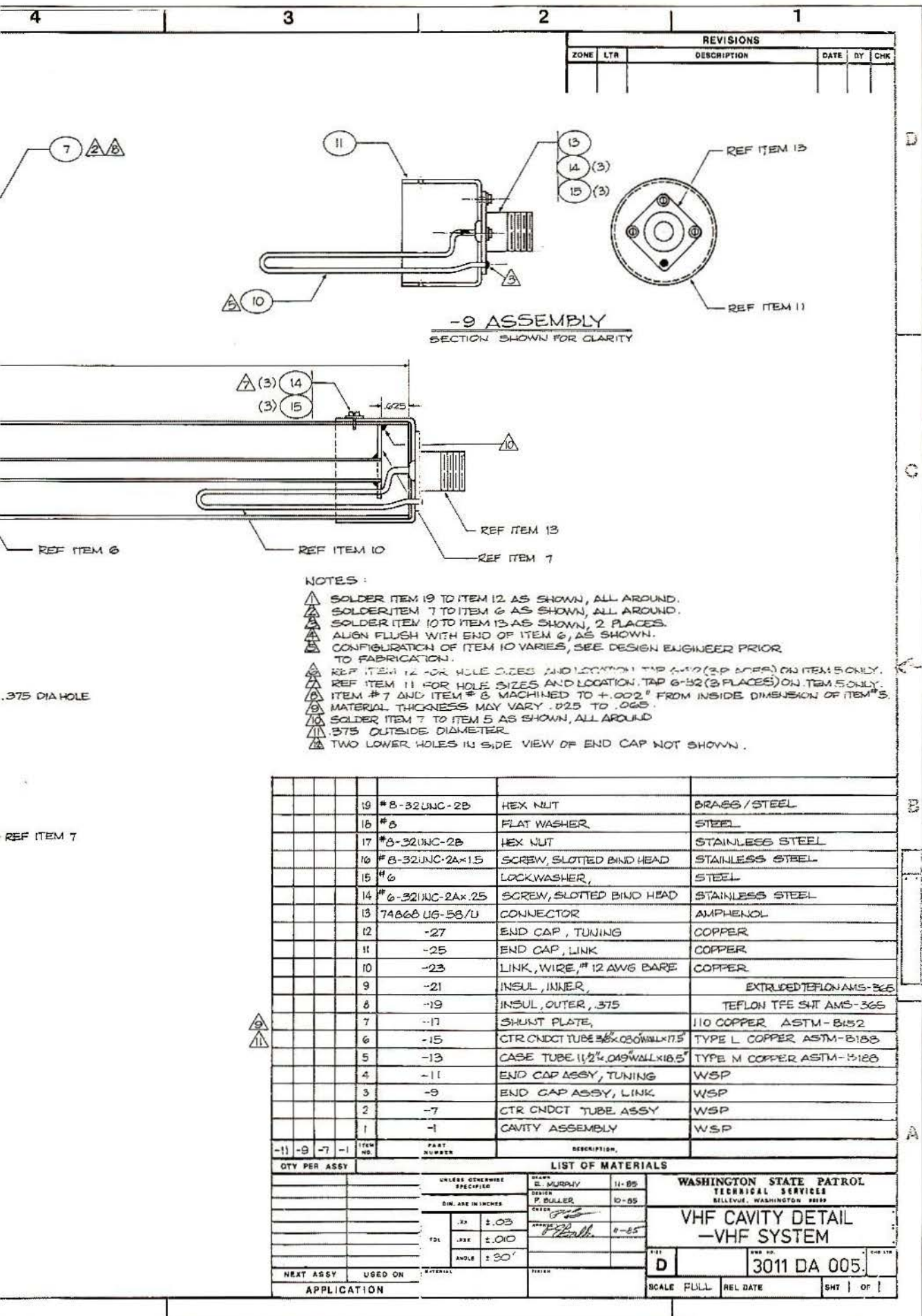


Figure 1. Assembly drawings for VHF cavity filter construction. This model has been in service for 15 years.



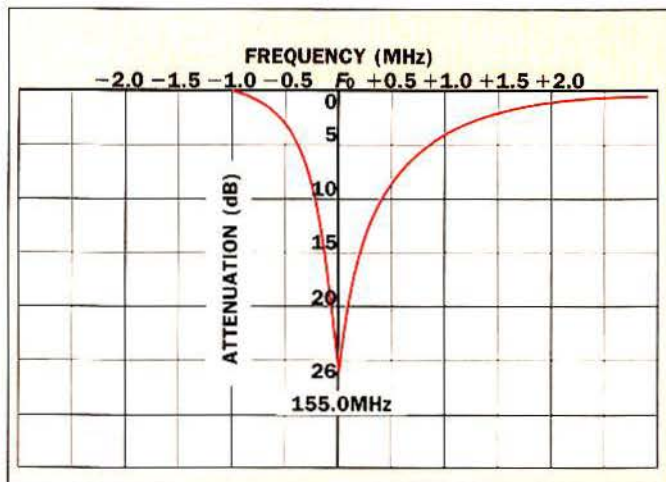


Figure 2. Decibel attenuation vs. frequency of a single-pipe cavity directly connected with a coaxial "T." The shape of the notch is that of a low-pass filter.

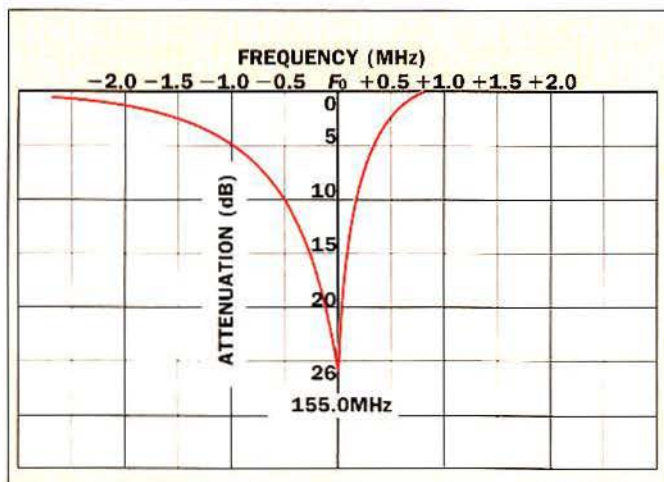


Figure 3. Decibel attenuation vs. frequency of a single-pipe cavity connected with a quarterwave stub, shifting the response to that of a high-pass cavity.

proportional to its volume. The larger the volume, the higher the Q. It is also influenced by the amount of coupling, called the "loaded Q," (Q_L). The relationship between selectivity (3dB bandwidth) and Q is demonstrated in the equation

$$Q = F_0 \div BW$$

where F_0 is the center frequency and BW is bandwidth.

As the Q is increased, the bandwidth decreases, or sharpens, the frequency

response. Increasing Q for more selectivity, the insertion loss increases, as determined by the equation

$$L = 20 \log_{10}(1 + (Q_U \div Q_L))$$

For a bandpass cavity, Q_U and Q_L are transposed.

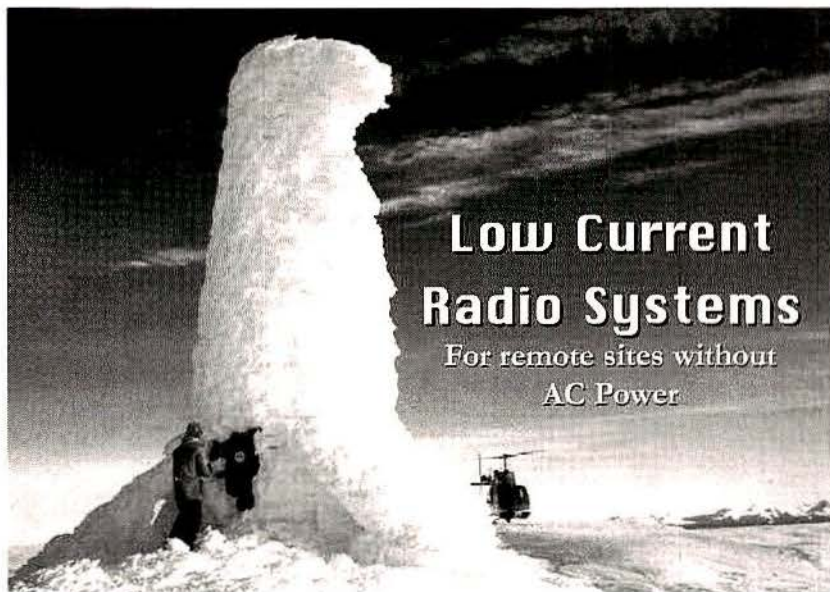
Values of Q range from 2 to 5 for broadband applications, such as a quarterwave coaxial cable, to that of a crystal having Q values beyond 10,000. The average Q for a 10-inch diameter

VHF cavity is about 350.

For coaxial cable use, cavities use *coupling loops*, usually identified by the insertion loss (i.e., 0.5dB, 1dB or 3 dB). The 0.5dB loop reduces the Q factor more than the 3dB loop. Another way of stating it is that a 0.5dB loop loads the cavity much heavier than the 3dB loop. Operating a cavity at $\frac{3}{4}$ -wavelength provides a higher value of Q, but it is generally not economical.

The assembly drawing shown in Figure 1 on pages 34 and 35 shows the design and construction of a cavity that has been in service for more than 15 years without failure. It was fabricated from 17.5 inches of 1.5-inch-diameter copper pipe. The only drawback is its temperature tolerance. The cavity is not recommended for applications where the ambient temperature will swing from -30°F to $+120^\circ\text{F}$. However, it is well-suited if the building can be maintained between 50°F and 90°F . If a reasonable temperature environment can be maintained, this may be just the thing for you. This design evolved because of the ease of repair and construction from readily available materials found in well-stocked hardware stores or at refrigeration-supply specialty stores. Coaxial connection to the cavity can be made with either type N or the common SO239 connectors. Test results show the "N" fittings are superior when three or more cavities are connected in any fashion.

The area of the loop (area between conductors) determines the amount of cavity coupling. Squeezing the loop conductors together decreases the total loop area, thereby reducing coupling, while increasing the loop conductor spacing increases coupling, which increases attenuation. The photographs of selected components on page 32 show the final form.



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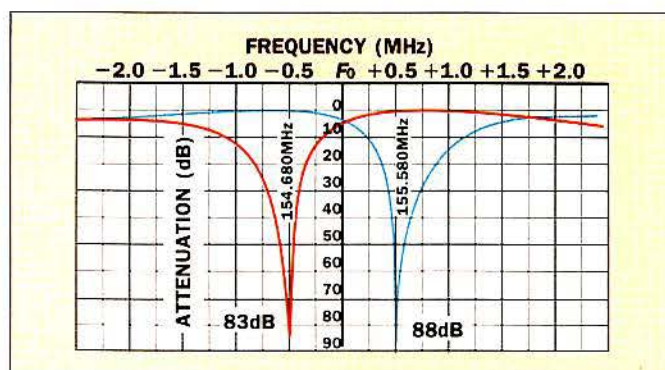
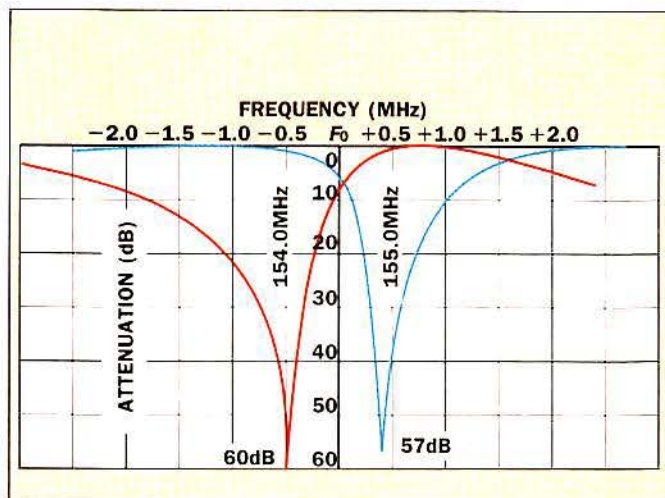


Figure 4. (Left) Decibel attenuation vs. frequency of a four-cavity assembly tuned at 1.0MHz spacing, with each cavity adjusted to 26dB of notch.

Figure 5. (Above) Attenuation vs. frequency of a six-cavity system at 900kHz spacing, with each cavity adjusted to 24dB of notch.

Initial adjustment

Each cavity should be individually adjusted to about 25dB if the frequency separation is 900kHz or more and to 20dB if approaching 800kHz spacing. Increasing the loop area will not only increase the notch attenuation but also the insertion loss close to the notch frequency. A spectrum analyzer with a tracking generator should be used as a tuning aid to display the notch while changes to the coupling are made.

Figure 2 on page 36 shows the frequency response of a single cavity

connected directly by a coaxial "T." Note that the shape of the notch is that of a low-pass notch filter. Adding a quarterwave coax from the "T" to the same cavity shifts the response to that of a high-pass cavity, as shown in Figure 3 on page 36. One-eighth-wave cable attached to the cavity makes the response uniform on either side of the resonance.

Three cavities interconnected with quarterwave cables will result in a nominal low-pass notch of 80dB. Three cavities, each having a quarterwave stub, and interconnected with quarterwave cables,

gives a high-pass notch of 85dB. Connecting each notch filter to a common point with another quarterwave cable yields a *cross-notch duplexer*. Figure 4 above shows the response of four cavities interconnected in this fashion and tuned at 1.0MHz spacing. In this case, each cavity was adjusted to 26dB of notch. Figure 5 above shows the response of a six-cavity arrangement, with each cavity adjusted to 24dB.

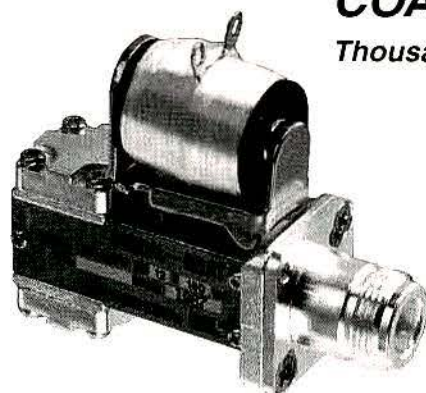
Filtering

One application for a notch cavity is the attenuation of an offending 155MHz transmitter generating noise on a receiver tuned 800kHz above or below the transmitted frequency. Adding a one-, two- or three-cavity assembly on the output of the transmitter reduces the offending noise with minimal attenuation to the transmitted signal. Where available space is a concern, this assembly can be mounted inside the base station cabinet. Installations are in service, using this design, that couple many receivers to one line with less than 0.25dB insertion loss. The common method of connecting two receivers, with an impedance-matching harness, nets about 3dB power loss. Another useful application is combining two 100W simplex base stations to one antenna. The spacing is 900kHz, and insertion loss is 1.25dB, resulting in 87W from each transmitter going to the antenna, as shown in Figure 5.

These cavities are most economical where the spacing between channels is greater than 800kHz. Anything closer than 800kHz with insertion loss less than 2.0dB requires a cavity Q greater than is possible with 1.5-inch-diameter pipe.

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The most economical method of mounting these cavities is to use the



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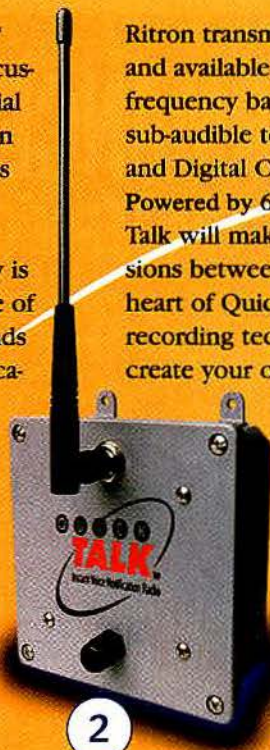
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pipe-support systems developed for electrical conduit, often known by the trade names Unistrut or Superstrut. The pipe straps do not affect the tuning when fully tightened. Heat-shrink tubing of sufficient length is placed around the 1.5-inch copper tubing to isolate the copper metal from the steel mounting hardware. This prevents the dissimilar metal electrolysis from taking place. A benefit of the mounting scheme is that the entire coax and cavity is dc-isolated from the mounting assembly, which prevents unwanted ground loops.

Always use double-shielded or solid

outer-shield cable to interconnect cavities and also to connect to the equipment and antenna. Single-shield cable, such as RG8/U or RG58/U, has too much leakage and prevents maximum attenuation. It is also a source of extraneous radiation.

Success stories: Interference

The Washington State Patrol (WSP) was receiving severe interference on 155.580MHz from another transmitter on 154.740MHz located several hundred feet away in another public safety building. The WSP receiver desense

measured 35dB. A two-pipe cavity (40dB attenuation) was installed on the offending transmitter's transmission line, which eliminated the desense. The transmitting power output was 95W without the filter and 93W (0.09dB loss) after the filter was installed. Both parties are pleased with the results.

Another case involved the National Weather Service (NWS) transmitter at 162.550MHz, U.S. Customs at 165.2375MHz and WSP's repeater transmitter on 155.580MHz mixing, which created interference to WSP's repeater input. A four-pipe cavity was installed on the repeater input with two cavities tuned to the U.S. Customs output frequency and the other two cavities tuned to the NWS frequency, which eliminated the problem.

In the third case, the FBI needed a remote receiver at one of WSP's communications site. The frequency separation was more than 7MHz, making the installation of a two-pipe cavity more attractive than the installation of another antenna for the FBI. The two-pipe cavity coupled the two receivers to the single antenna with only 0.20dB of insertion loss. The common approach of using 75Ω quarterwave cables and a coaxial "T" would have resulted in more than 3dB of loss.

Combining radios

The most useful application is combining several transmitter and receivers to one antenna. Having separate antennas for each transmitter often generates problems in fringe areas. A mobile unit will find a hot spot for two-way communication on a given channel, but when the unit moves to another channel, communication is lost if the antenna is on the other side of the tower or, worse yet, if the antenna is much lower on the tower than the antenna used for the initial contact channel. Combining both radios to the same antenna provides identical communication capabilities. In other words, the hot spot is the same for both channels. An added benefit to this application is fewer antennas required on the tower. As many as four transceivers can be coupled on one antenna with these pipe cavities.

Maintenance

If the insulator inside the 3/8-inch pipe fails because of a voltage breakdown, it can easily be replaced. Remove both end caps and insert a rod inside the 3/8-inch pipe to force the Teflon insulator out. Insert a new insulator from the tuning side of the cavity.

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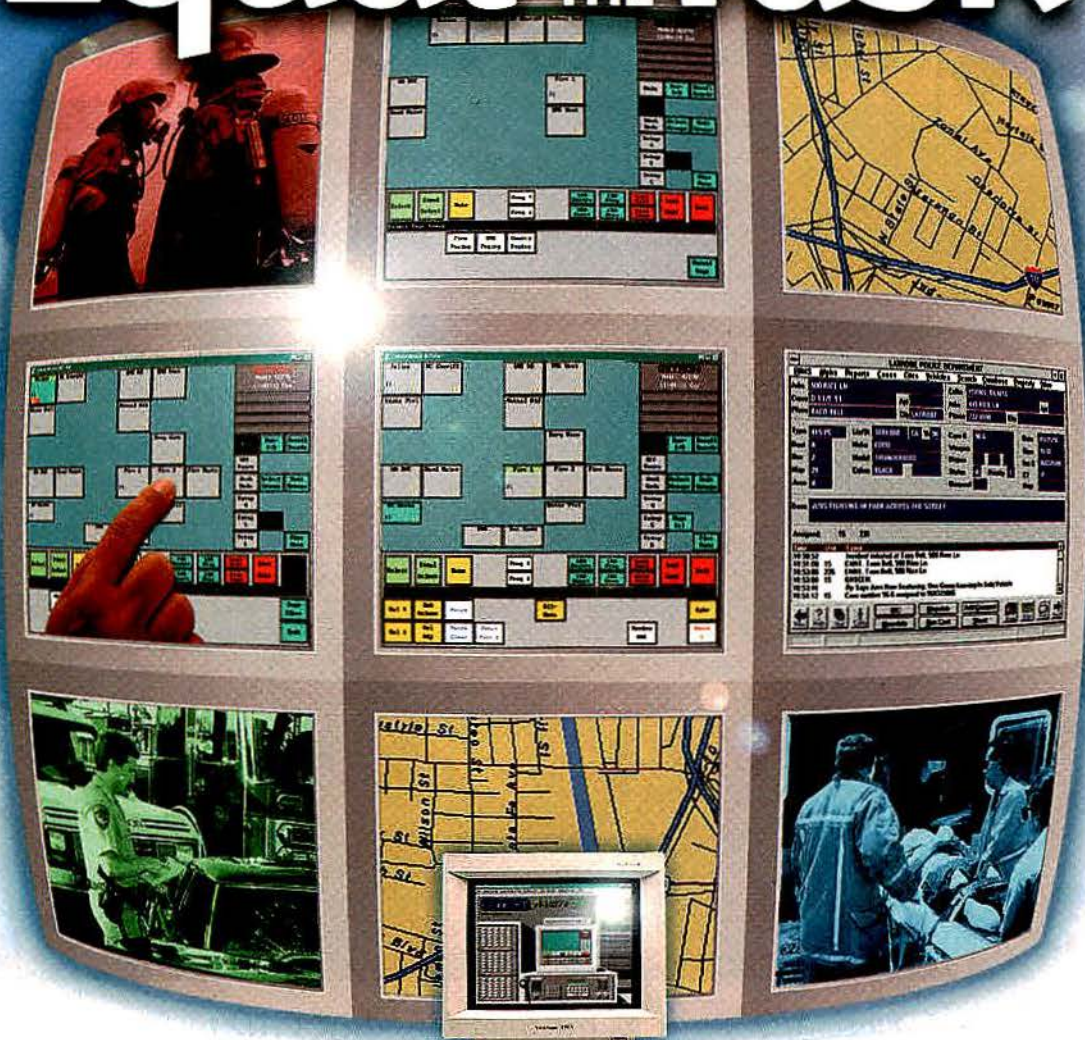
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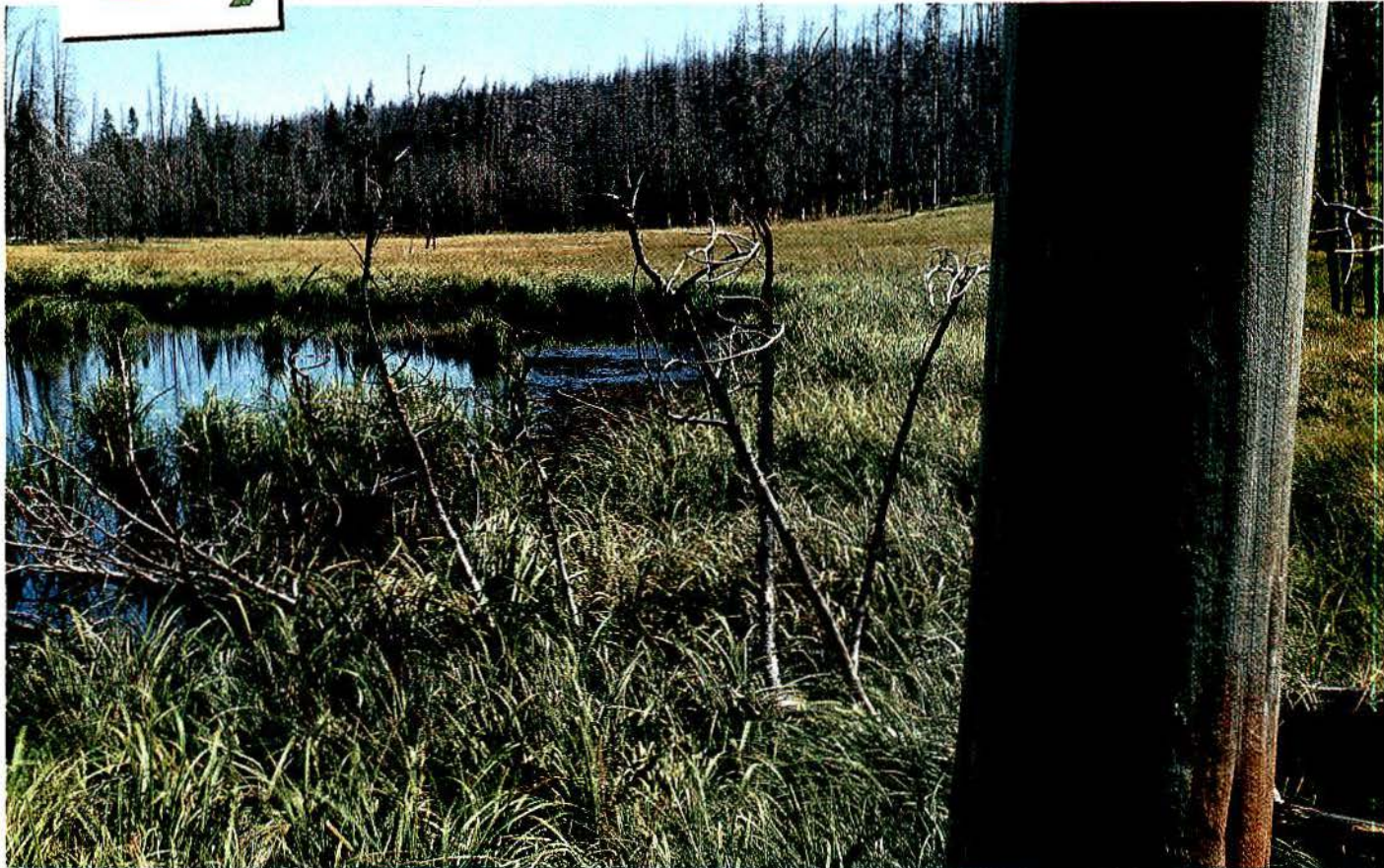
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Computer-aided dispatch comes to the Ozarks



Stone County, MO, turns to Windows NT-based CAD to facilitate consolidation of emergency services response.

By Simon Aleman Jr.

In the past, computer-assisted dispatch (CAD) systems were out of financial reach for all but the largest cities and wealthiest communities. Now, new technologies are delivering the benefits of emergency response automation to even rural areas in middle America. One such example is Stone County, MO, a small (30,000 citizens) but fast-growing county adjacent to the country-music tourist attractions in Branson, MO, and the Ozarks recreation lakes.

Stone County was faced with rapid population growth, a swelled temporary population during peak tourist seasons, no emergency 9-1-1 service and a push from citizens for an automated

system. County officials decided to build a centralized, consolidated dispatch operation to handle calls for police, fire and ambulance services.

Newer CAD systems, unlike the proprietary systems of the past, are based on hardware and software industry standards and deliver the ease of installation, reduced operational costs and flexibility for upgrades that Stone County requires. Using computers to automate 9-1-1 public safety answering points (PSAPs) and dispatch centers, including fire, emergency medical services (EMS) and law enforcement services, CAD provides an automated method of logging calls, dispatching units and tracking activities. This makes emergency vehicle dispatch operations more efficient, more manageable and easier to track.

Stone county has nine volunteer fire departments that must be coordinated in the dispatch system, as well as two EMS districts, a county sheriff's department and multiple city police forces. To address the county's need for advanced integration of disparate services, Malcom Vedane, director of emergency services for Stone County, required a CAD vendor with the systems and expertise to handle the various reporting needs of the three emergency categories, as well as the ability to accommodate different jurisdictions.

Currently, Stone County relies on two dispatch centers, one operated by the county sheriff's department and the

Aleman is founder and vice president of product marketing for Global Dispatch Technology, Oklahoma City.



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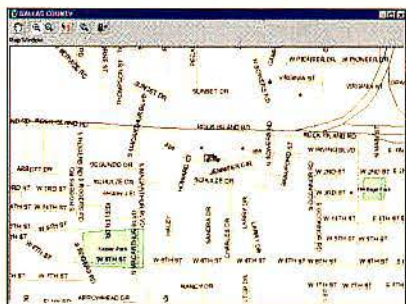
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On-screen political mapping allows CAD to pinpoint locations.

other within the Kimberling City's police department. Neither center has significant automation. Because the existing decentralized structure was inconsistent with a 1996 referendum in which Stone County voters approved funding for both new 9-1-1 and CAD systems, county leaders chose to give voters the opportunity to once again make an investment in the future of the county's emergency systems. In a bold move toward progress and integration, the citizens overwhelmingly approved the construction of a new, centralized dispatch center in 1998. The county

plans to be fully operational by December 1999. [The center's implementation will be covered in a future issue of *MRT*.]

Growing pains and rough terrains

Stone County faces peculiar population challenges. In close proximity to the numerous entertainment complexes of Branson as well as nearby recreational lakes, the county's population can expand to a million people in the spring and summer when tourists flock to these popular destinations. The tourist season brings more car accidents, traffic jams and other routine roadway mishaps that place a burden on emergency services.

In addition, the county's permanent population is climbing, making Stone the second fastest-growing county in Missouri. To accommodate the rapid growth, Vedane sought a CAD system with the flexibility and scalability to grow along with the county.

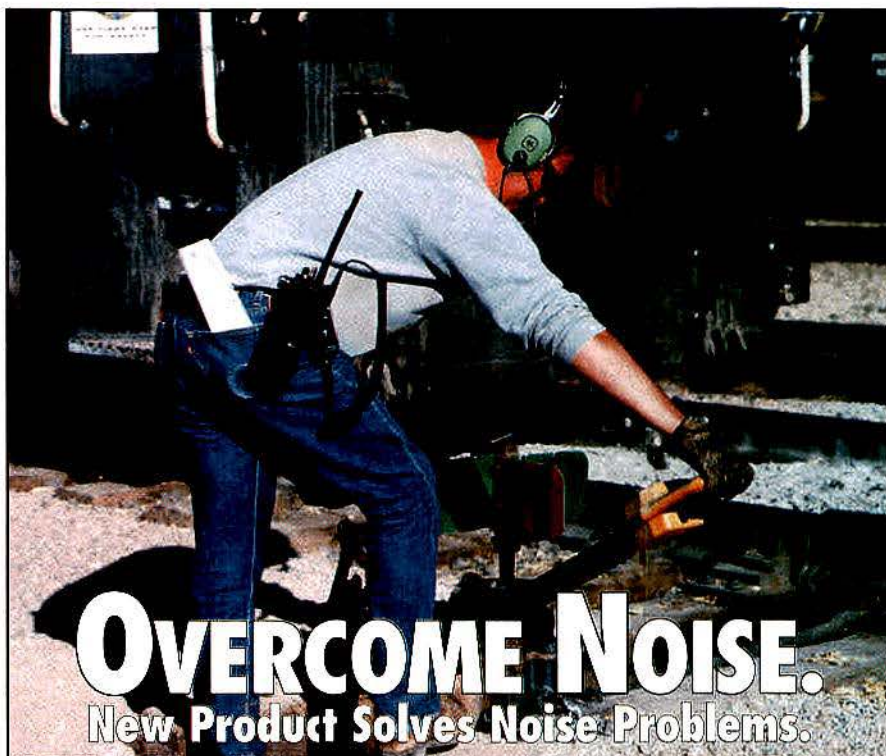
Stone County officials also have a few geographical quirks to worry about. The county is long, north to south, but narrow and crisscrossed by mountain ridges. Because Stone County has many hills, the new dispatch center requires high ground so that radio signals transmitted from the center can reach all parts of the area. To accomplish this goal, the county is building the center on a ridge about 1,400 feet above sea level. Radio repeaters are also being installed throughout the county to push signals to outlying areas.

"We can't change the roads, straighten the curves or shorten the mileage between a fire station and a burning house," Vedane said. "The only thing we can do is get the call into the dispatch center, get the call defined as to what is needed as quickly as possible and then instantly dispatch and do everything we can to make sure the driver has the tools to get there via the shortest route possible."

Matching necessity with CAD

After considering reporting capabilities, mapping features, affordability and the ability to coordinate multiple fire and police departments, as well as ease of use and training, Stone County selected CAD Assist 2.4 from Global Dispatch Technology.

"What particularly interested me was Global Dispatch Technology's willingness and ability to make product enhancements that suit the needs of a moderately sized yet dynamic county like us," Vedane said. "Quite frankly, we were looking for somebody who has the system flexibility to fit us. We



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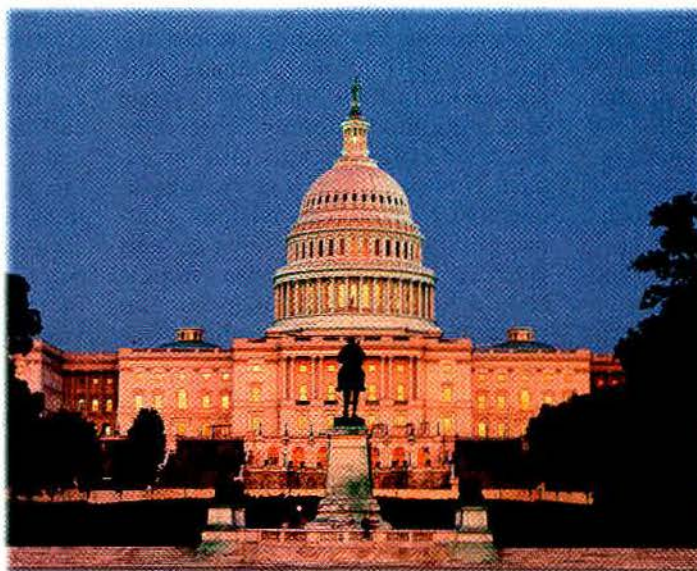
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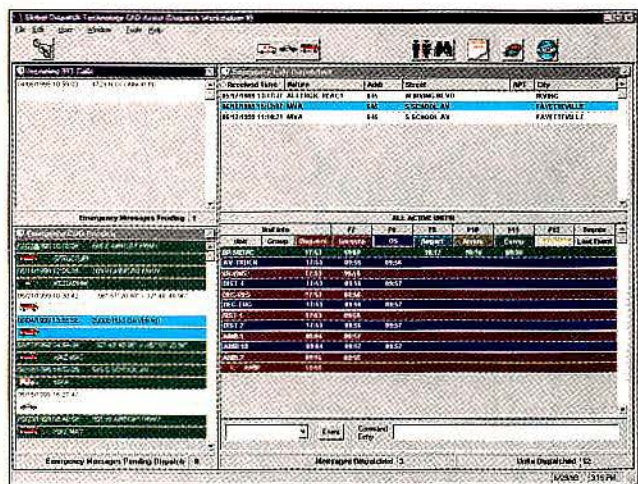
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A CAD workstation screen allows the dispatcher to track incoming 911 calls, messages sent and notifications to mobile response units.

found that with CAD Assist and Global Dispatch."

The CAD software is based on mapping technology, digitized information rather than purely database information. The system is designed for dispatch centers serving communities less than 250,000 people. The software is customer-configurable and works on a Windows NT platform. As many as 45 layers of physical and political landmarks (streets, hydrant locations, commercial business, etc.) can be overlaid

on the mapping, which is based on BLR subscription maps.

By making emergency vehicle dispatch operations more manageable and easier to track, the CAD system is helping Stone County achieve the increased efficiencies its citizens expect. Now, emergency services management can program custom information into the system, such as what specific type of response vehicle should be dispatched to particular types of incidents. This relieves the

individual dispatcher from the pressure of making spur-of-the-moment decisions about which units to send.

The CAD system's flexibility and mapping functionality are critical tools that help Stone County communicate and coordinate resources among its various agencies. The ability to easily change zones—that is, the zone from which a unit responds to an incident—was a particularly important consideration, given the rapid development and population growth of this area. Stone County can update the system to include new subdivisions and commercial developments in the mapping database.

With all these features working together, the CAD system instantly lets dispatchers know from what district a call originates and also identifies which emergency agency should respond. Because the county's law-enforcement agencies operate in geographic districts, each agency has a district from which it collects taxes and provides service. All this information is identified in electronic maps within the CAD system, and each address in the database is accompanied by its district information and the emergency agency that provides service in that district. From this database, Stone County is customizing its application of the software by adding information on which agencies provide back-up help in particular zones.

Flexibility in report writing was also a central consideration for Stone County. The CAD system is designed to produce reports tailored for law enforcement, fire and EMS agencies that include patient name and information, mileage the unit travels to the incident scene, automatic location identification (ALI) and automatic number identification (ANI), response time and other customer-specified reports. The mileage information, in particular, is important because emergency agency billing is based partially on how far units travel to an incident.

The benefits of Stone County's new CAD system are readily apparent to the leaders of the region's emergency services.

"Our area faces the kind of complex, growth-related management challenges that are typical of municipalities our size," Vedane said. "Now that these cutting-edge CAD technologies have been made affordable, we can capitalize on the amazing advantages of automation. We're extremely pleased with CAD Assist and look forward to the many opportunities its flexibility presents for us."

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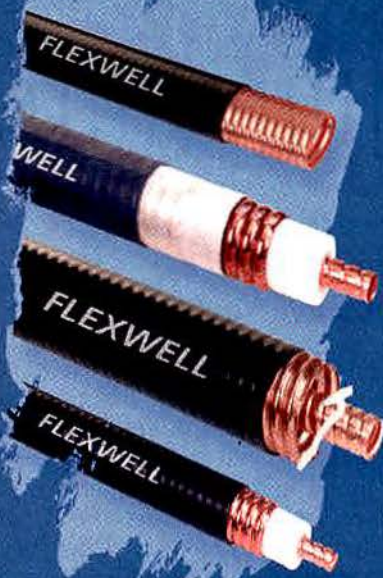
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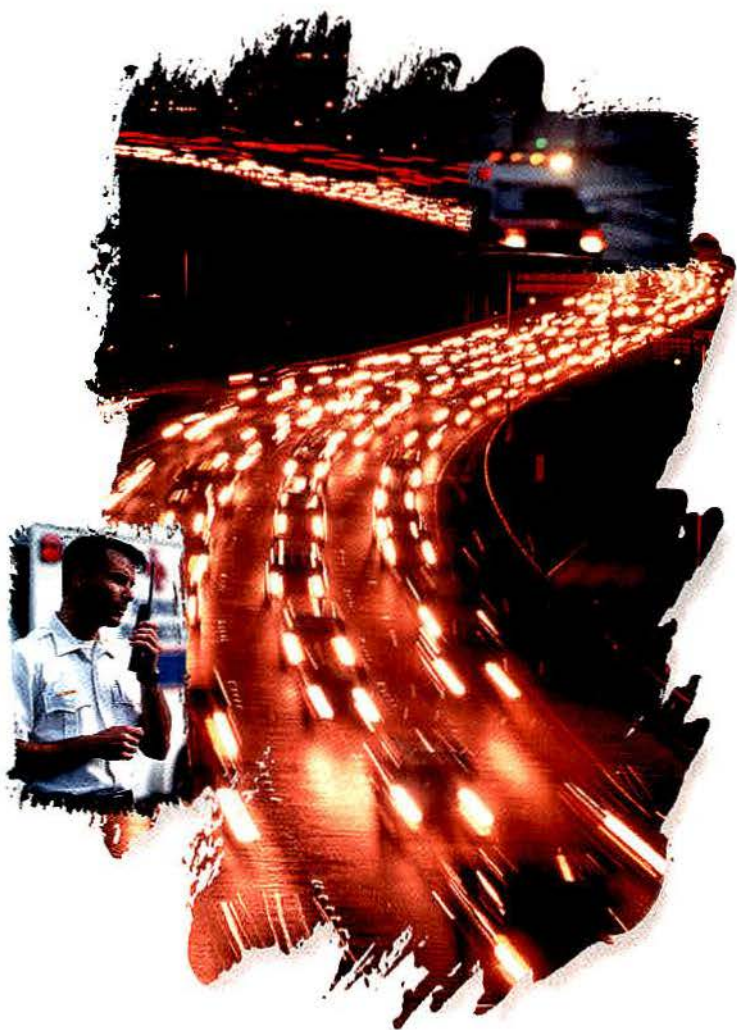
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The future of fire mobile data

MRT does some crystal-ball gazing with Gary E. Kaiser, the new president of Lake Mary, FL-based public-sector software provider HTE, and his public safety and justice systems director, Don Nagle.

By D. A. Keckler

Real-time communications, hazardous situation information and management of resources are all roles mobile data will play in the future for firefighters. A recent study by the Public Safety Wireless Network (PSWN) estimated that among fire and EMS agencies with more than 100 operatives, less than a third currently use mobile computing. However, the study projected that level of usage will double by the end of this year. To find out how mobile data will be implemented, MRT visited with Gary E. Kaiser, a former firefighter, and county administrator, who in April, assumed the job of president and chief operating officer with HTE, a Lake Mary, FL, developer of software for government applications. During our conversation, we were joined by Don Nagle, director of public safety and justice systems for HTE. Nagle is a past contributor to MRT ("Virginia Agency Speeds Queries and Dispatch with Mobile Data," June 1998).

MRT: Gary, your background is in fire and county management, and now you've switched over to the private sector. Could you discuss this transition?

KAISER: I spent about five and a half years with the city of Altamonte

Springs, FL, and then I spent 25 years with Seminole County [north and adjacent to Orange County and Orlando, FL]. I was hired as the chief fire administrator, initially, and about two years later, I was named director of public safety, and they reorganized county government, and that included everything other than law enforcement. It was fire/rescue, EMS [emergency medical services], communications, telephones, 9-1-1, dispatching, animal control and emergency management. About three years ago, they had a change in county management, and they drafted me to be county manager. I served in an "acting" capacity for a few months and tried to get them to do a search and hire someone, and they wouldn't do that, so I took the job permanently. I retired here in



Gary E. Kaiser

Keckler is features editor. His email address is: david_keckler@intertec.com.

The software applications illustrated in this feature are developed and marketed by HTE. The images represent the company's Fireline software suite.

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April with 25-and-a-half years.

It was an interesting time. I spent some time as a police officer when I was in Altamonte Springs and as a reserve deputy sheriff for Seminole County.

MRT: What were your motivations for taking a job in the private sector?

KAISER: It's something that has interested me for years. I've tried to follow a lot of the private sector business and tried to employ a number of business techniques and strategies in government. In fact, we had re-engineered Seminole County government in the last three years, and if you look at our Web

page, it says "Seminole County: It's a business doing government work." I enjoyed doing that, and I also did private consulting on the side for a number of years. And as a secondary income over the years, I did real estate syndication, so the business market was not something foreign to me.

MRT: HTE has a current \$1.6 million contract to provide a public safety software system for Leavenworth, KS. What other projects are in the works?

KAISER: East Point, GA. just bought our entire software suite—everything—for \$4.6 million; there's

also Alexandria, VA, Providence, RI, and Tyler, TX.

MRT: With the intention of being a complete software provider, are you finding package deals more common now, with public safety, fire, EMS and services all wrapped together, or does it tend to be more discrete among those individual agencies?

KAISER: I think we're seeing a tremendous activity in the package aspect of it.

MRT: There seems to be a lot of politics in some jurisdictions, with fire and EMS trying to keep on separate sides of the street. Is this a common or isolated situation?

KAISER: I think there's a long history of that. That's just the nature of it. I've seen it over the years not only among police, fire and EMS but police-to-police and fire-to-fire. You see it in federal government agencies, with DEA, Customs and Treasury. We've all known people that have worked in those organizations that pretty much all tell the same story. That's just the nature of the beast.

MRT: As an administrator, you've had to work with budgets, and trimming budgets. When it comes to software suites and large communications systems, there are always budgetary concerns. Does "one size fit all"? How does it vary between a large city and one with less than 100,000 people?

KAISER: I think you have to look at the individual needs of the community, and that's what we do very carefully. I think you need to do that nationwide. I agree that governments, in general, in recent years have had to trim tremendously and to become competitive and to compete with private enterprise. To that end, in Seminole County, for example, where I was manager, we outsourced our entire information technologies [IT] operation. We felt that our core business was serving citizens in the manner of paving streets and providing those services that they couldn't provide for themselves—police, fire, emergency medical, emergency management, disaster recovery and those kinds of things—and to stay away from those things that we did not do well, that were not our core business. We look at the technology and want the *result* of that. We want the reports generated and the data and so forth so we can use that as a management tool. But in doing so, we said "We shouldn't be in the computer business; the *computer people* should be in the computer business." So we outsourced the entire operation and asked that to be managed.

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San Diego Fire-EMS	3	3	3/1/1999	3	San Diego	3/1/1999
San Diego Fire-EMS	4	4	4/1/1999	4	San Diego	4/1/1999
San Diego Fire-EMS	5	5	5/1/1999	5	San Diego	5/1/1999
San Diego Fire-EMS	6	6	6/1/1999	6	San Diego	6/1/1999
San Diego Fire-EMS	7	7	7/1/1999	7	San Diego	7/1/1999
San Diego Fire-EMS	8	8	8/1/1999	8	San Diego	8/1/1999
San Diego Fire-EMS	9	9	9/1/1999	9	San Diego	9/1/1999
San Diego Fire-EMS	10	10	10/1/1999	10	San Diego	10/1/1999

'This has been a neglected funding target ... called "disaster services," or "civil defense" or ... "emergency management," but it is ... the fire services.'

—Kaiser

We want to see what kind of technology they're running now, as well as what their capability is to staff it, so that we can be walking through the door with a "market basket" of products, as opposed to walking through the door and saying "This is what our product is, and this is right for you." We have two CAD systems, we have one records management system, and we have multiple core systems. We want to be able to walk in the door and provide solutions. I know that sounds corny, but not a lot of software companies out there in this market have multiple capabilities to do that.

MRT: Is it the modularity and inter-connection capability of the software that creates that opportunity?

NAGLE: It is, but it's also the different platforms that they run on. If you've got a small- to medium-size department with a limited DP staff and capabilities, we're going to recommend a host-based system. If you've got a technical staff, we're going to walk through the door and bid a client-server environment, an NT environment.

MRT: What is your estimate of the penetration of mobile data into EMS and fire markets?

NAGLE: I think we're just at the tip of the iceberg. Gary and I were discussing

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MRT: We've heard that same issue ("core competency") raised in the private sector, such as for utilities ["Communications Outsourcing to Utility Companies," *MRT* June 1998].

KAISER: Absolutely. Look at the deal that's out on the street right now

for San Diego. That's a billion-dollar-plus deal.

MRT: How do you handle a community that's at a zero level with data experience? How does HTE assist a community with needs assessment for fire or EMS data?

KAISER: One of the first things you want to establish is: Do they really want to do it for themselves, or are they looking at a multijurisdictional, multifaceted approach? Don can address that, because he's involved with that on a daily basis.

[Nagle joins the conversation.]

NAGLE: What we look at initially is population base and calls for service.

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5/3/99	10:46:49	Text: Dispatched 1179 1179 12:24:00 123 Main St Apt A...	Normal
5/3/99	10:47:56	Text: BOL 1065J BERTAGNA SR VICTOR 184J, 11/18...	Normal
5/3/99	10:47:25	Text: 2372 LOCATED SUSP VEH W/1 TOY PT, ALL C...	Normal
5/3/99	10:48:23	Text: FOR FOOTBALL AND CENTRAL UNITS, 280 FRM...	Normal
5/3/99	10:45:37	Text: CAN U PUT OUT THE BOL OUT FOR ME, 82 OR...	Normal
5/3/99	10:45:06	Text: BOL 1065JX DRENDEL, CHRISTINA DOB 11/12...	Normal
5/3/99	10:44:50	Text: BOL 1065JX WF J DOB 06/09/85 5' 1" 110 LBS LO...	Normal
5/3/99	10:40:12	Text: BOL 1065JX POSS SUCRICAL LS 416 334 KOHLE...	Normal
5/3/99	10:47:10	Text: PRELIM INFO ON LG QUAKE IN NORTHERN PH...	Normal
5/3/99	10:46:54	Text: BOL OFFSAFTY, 415 POS 417, NB 101 TULLY, D...	Normal
5/3/99	10:46:39	Text: THANKS ALL, THE PAY JOB AT OVERFELT HS...	Normal
5/3/99	10:45:21	Text: B.O.L. 1065JX GARCIA, REINA 07/31/83 11FJ 5' 1...	Normal
5/3/99	10:44:35	Text: DATE: 06/12/96 TIME: 18:47 MATCHED ON LNK...	Normal
5/3/99	10:46:08	Text: CANCEL 1065JX DRENDEL, CHRISTINA 11/12...	Stored Ph
5/3/99	10:45:52	Text: FROM 5119, NEED 1 PERSON TO WORK OVER...	Stored Ph

'We want to take what's on the desktop in front of the dispatcher, or within the fire station, and put it in a remote wireless environment.'

—Nagle

that we've done a huge market share in law enforcement because of the funding mechanisms that are in place and all of the federal grants that have come down the road over the last 10 years. Also, that money is used to bring police officers to the street and for mobile data environment. In the fire departments and the EMS services, there hasn't been a revenue stream for them to accomplish those projects, except with their own budget, which is difficult at best. There are a lot of very good programs that have come forward over the last couple of years, and great technology for fire services and EMS, but it's not even re-

motely close to the penetration the law enforcement side has had.

MRT: We've noticed recent federal legislative efforts, such as H.R. 1168, to make billions in funds available to local fire operations through the Federal Emergency Management Administration (FEMA), including money for communications. Could that be a boon for getting that penetration?

NAGLE: Absolutely. I'm sure that Florida and the wildfires we had last year played a significant role in that issue. Communications issues that were taking place, and the mobile data issues with that, in trying to coordinate responses,

were astronomical. That's good news for us, too. We've watched that very closely. We actually have a grant-writing program on the law-enforcement side where we provide services for our customers. We help them write the grant and provide a grant writer for them to obtain this type of funding.

MRT: Is that program limited to law enforcement, or will it be expanded?

NAGLE: Absolutely, we'll expand it.

KAISER: I think you're also seeing a reaction, not only to the wildfires, but also to Hurricane Andrew, to Hurricane Hugo, to the Oklahoma City kinds of events where FEMA has had a major presence, and the fire services have had a presence and a response via what used to be "emergency management" that's unprecedented in the past. I think the federal government has recognized the intricate role the fire services play in that initial response and it's said "This has been a neglected funding target for years, but yet is a major response component." In years past, it was called "disaster services," or "civil defense," or more contemporarily "emergency management," but it is, for the most part, the fire services. So I think they're saying "We've watched this happen. We've seen significant deficiencies in commu-

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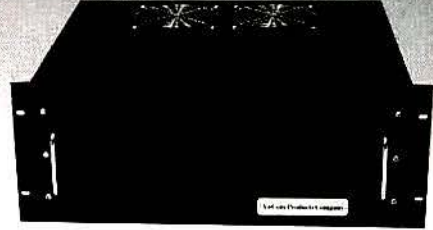
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nications in multi-agency responses." All of these events were way beyond the capabilities of any one or two agencies.

In Hurricane Andrew, I was down there the morning after the hurricane. We sent two strike teams down there. Our county provided a mobile emergency operations center adjacent to the Homestead city hall for the first days of operation. That, coupled with the wildfires, has changed awareness dramatically.

MRT: What capabilities do software and mobile data now offer to cope with these types of events?

KAISER: I think being tied into AVL and GPS and imaging. They need real-time mapping. They need to be able to send over photographs for the EMS side. Don and I were discussing the large percentage of calls that are EMS-related with trauma issues where you can send that data directly to a physician in an emergency room in real time and he can see the mechanism of injury. Those kinds of things have profound effects. Like everyone else, they need information *now*, in real time. The problem is bandwidth and all the other issues that the FCC has been struggling with over the last several years.

MRT: You've anticipated our direction. How can technology help get mobile data on-line, given existing bandwidth problems for voice communications?

NAGLE: In every single scenario, it's never the same. If there's an embedded infrastructure, we want to work with it. If there's not, then it's CDPD that we're dealing with and depending on the coverage and other issues that are associated with that. It's never "one size fits all," and I don't see that going away. All of public safety—law enforcement, fire and the EMS side—all face the same issue. The issue has been, and will continue to be, the availability of frequencies and bandwidth. Until we address that issue on a federal basis, and somebody makes a hard-and-fast decision, I don't see that problem going away.

KAISER: What you're seeing is a collision between a bona fide public safety need and the commercial applications and the money that's involved.

MRT: What do you mean by "a collision?"

KAISER: How competitive the commercial market is, and the ability or inability of the FCC to deal with these issues in a timely manner

NAGLE: It's the auctions of frequencies for PCS and other systems that have come forward. Public safety has a problem because, obviously, the FCC is looking at both sides of the ledger, the

public safety/public interest side as well as the commercial side of the endeavor.

MRT: Public safety communications officials have told us that although Congress is diverting a large chunk of spectrum reclaimed from HDTV conversion to public safety, it may be as long as 10 years before it can be effectively used.

NAGLE: And you face the issues of embedded infrastructures, backward compatibility and additional funding to new technologies and frequencies that are coming forward.

MRT: It seems like it has a chilling effect on new applications that could be

offered, such as fingerprint transmission, real-time video and response type-dependent assignment of bandwidth.

NAGLE: We were talking about CDPD, and how that hasn't taken off in terms of the coverage in so many areas as quickly as everything else did because it looks like the providers are building that infrastructure "pay as you go" instead of being willing to step out there like they did with PCS and everything else and take these huge gambles that "if you build it, they will come." That's holding things up.

MRT: In specific software applica-

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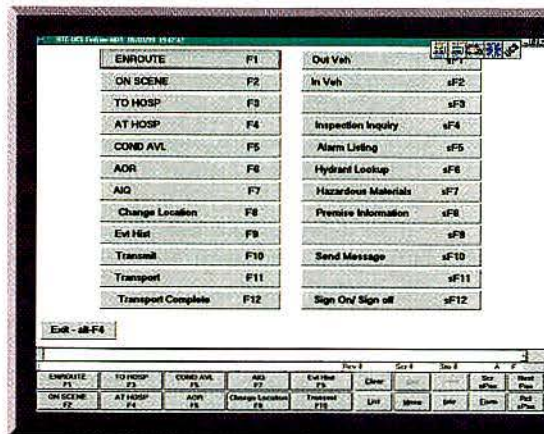
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'If you encounter a situation that escalates very quickly, what else can you count on?'
—Kaiser

tions, how important is encryption becoming for mobile data?

NAGLE: We're just starting to take a look at it now. We've got a new mobile data product called Mobile Data Browser that was driven by our customers coming back to us and saying "We want our mobile data to really look like what's on our desktop." We're just starting to take a look at the encryption side of that whole issue as we bring to the table the additional switches that attach to the CAD system.

MRT: HTE's main fire data program, "Fireline," is actually a software suite with add-on modules. How was that

program developed?

NAGLE: The goal and objective for us here is that we want to sell product suites. We want to take what's on the desktop in front of the dispatcher or within the fire station and put it in a remote wireless environment. So we've really taken all the issues about fires, inspections and CAD systems in front of the dispatcher and taken them to the Fireline product, which is wireless.

MRT: How does mobile data make a difference to the personnel in the field, in terms of personal safety, speed of response and successful conclusion to an incident? What does this really mean to

the person on the fire line?

KAISER: Well, information is power. And information in that business is also *safety*. It's their ability to access it themselves quickly, and without delay, and whatever piece of that information that they want or want to highlight. It just gives them greater control, faster.

NAGLE: They're looking at this as they're responding to an incident or a fire call. Their expectation has now become "Not only do we want to know where it is—show us a map of exactly how to get there and what is the best route for us to accomplish that—we want to see a blueprint of the building that's involved. I want to know a premise history of all the calls that have taken place there in the last six months, or a year, from computer-aided dispatch, and I also want to know what the last fire inspection looked like."

That is an expectation. From my background, which was law enforcement, that is the way that mobile data evolved. It was more information to that guy on the screen, so there was quicker response and better officer safety.

KAISER: It helps the responder develop his response to different scenarios. For example, in a mass-casualty situation, it helps tremendously to have

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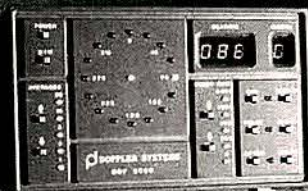


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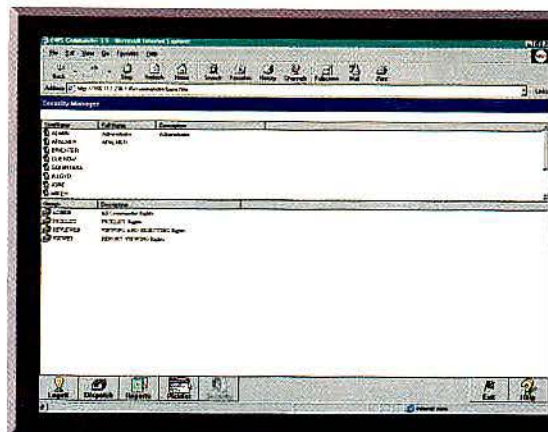
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'There are multiple databases out there; it's successfully integrating all of the different pieces to come up with what you need at the user end.'

—Kaiser

some kind of visual on what you're going to encounter in terms of floor plan, or lot layout or location accessibility, rather than just pull up there and only have a single-dimensional view. There's a huge advantage there.

MRT: What about the flow of information the other way, from the field back to the base? Is it as important for fire as it has proved in law enforcement?

KAISER: It's every bit as important. Not only for accountability but for the management of resources. It's what you have available at that point in time, what is going on, the impact on what your inventory is and how you handle simultaneous situations.

More importantly, if you encounter a situation that escalates very quickly, what else can you count on?

MRT: What is the blue-sky future for public safety mobile data? What kinds of things can we look forward to in the next five or 10 years?

NAGLE: It gets back again to the bandwidth issue. We had a lot of talk over the last several years about live-scans fingerprints and mug-shot imaging and all of those things for the law enforcement side. On the other side of the issue, on the fire and EMS side, every fire department that we deal with is looking for *systems status management*, where they can take historical data files, data based on times of day and days of the week, and really position their equipment appropriately for the fastest response.

MRT: So there is a predictive factor?

NAGLE: Absolutely, based on time of day and the types of incident that the historical files will bring forward.

KAISER: And it's very accurate; it's very effective. There's a lot of dimensions to that: weather, time of year, holidays, all kinds of things. As you get near the holidays, it's knowing that suicide rates go up and knowing where your target populations are for that.

In terms of equipment, certainly the

manufacturers will keep evolving, but I think the majority of it will be software-driven. I think the possibilities there are extremely exciting. There's a lot out there right now that could be used in terms of hardware, that, because bandwidth and frequencies haven't settled out, would be employed, and you'd have software programs for that if the green light was given.

Just reflect back on GPS. About 10 years ago, our county was chosen as a test site for one of the first mobile GPS systems for navigation They had the technology—the satellites were there—but they hadn't worked out the delivery system to take advantage of that. That's the limiting factor in terms of what we'll see in the next five years. We're hung up right now to a great extent in the public safety community by the limitations of the FCC.

MRT: What about the expansion of databases?

KAISER: Not only expanding, but integration of different sources is the key. There are multiple databases out there; it's successfully integrating all of the different pieces to come up with what you need at the user end. The tax assessor, the property appraiser, the GIS mapping, the CAD, the AVL—it's when you can link all of that together in real time and overlay multiple layers of GIS maps on a given specific location, water mains, gas mains, flood plain, elevations, all those kinds of things. They're all there—they're just out there, in many cases, separately. Our company is geared toward integrating all of that and providing that as a package.

MRT: So it's the data equivalent to the calls for interoperability in voice communications?

NAGLE: We refer to it as "total integration." In the Alexandria, VA, contract, we're doing an integration with the city's GIS system, and it's primarily for the fire department. ■

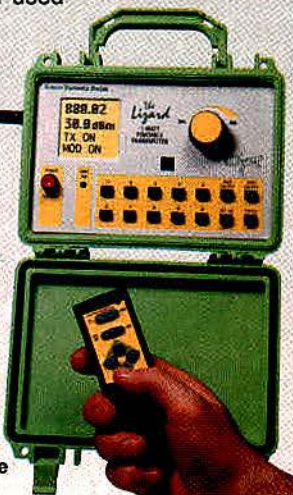
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Red skies and green lights

Two public safety agencies whose communications systems must meet the challenges posed by heavy tourism and volatile seasonal weather discover that emergency preparedness can hang by a dead battery.



By Jody Steinberg

Emergency preparedness is a major component of public safety, and emergency radios provide a critical link that enables those plans to run smoothly. An increasing number of city and regional governments are upgrading radio communications equipment, including 800MHz or 900MHz trunking systems. The goals of these upgrades are:

- ❑ to increase the reach of communications within a region.
- ❑ to expand interoperability to include more local agencies (i.e., linking fire and police to sheriff, military, water-

works, electrical, ambulance, etc.).

- ❑ to replace outdated systems before they become obsolete.
- ❑ to keep up with growth.
- ❑ to implement lessons learned from previous large-scale disasters.
- ❑ to comply with E 9-1-1 and Project 25 standards.

This need for quick response times and dependable communications has increased demand for two-way radio battery chargers. Two public safety communications officials, one in the British West Indies and the other in Florida, faced similar challenges to their communications preparedness—weather and tourism. They did their homework and researched communications and emergency response. They attended APCO conferences and consulted colleagues and industry profes-

sionals. Both developed plans for emergencies that also work under everyday circumstances, and both looked at the short- and long-term costs. They also included battery chargers that use a dynamic electrochemical waveform technology, called Enrev, in their proposals for new trunking system equipment. (See "It's a Portable Life, But Things Can Get Better," *MRT*, June 1999.) Solutions to battery problems that have plagued radio communications are becoming an up-front priority in system acquisitions. Their role as the "weak link" in critical communications will be tolerated no longer.

Crown colony communications

The Cayman Islands, located in the Caribbean Sea, are known for their hospitality, breathtaking natural beauty and

Steinberg is communications manager for the Advanced Charger Technology division of Enrev, Norcross, GA.

incredible coral reefs. A haven for tourists as well as businesses welcomed by the Islands' tax-friendly policies, the three islands that make up the Caymans are home to people from all over the world. The tropical climate responsible for the Cayman Islands' attractiveness is the same climate that can brew up a nasty tropical storm, or even a hurricane, with little warning. Progressive public safety planning to meet these challenges has led to the introduction of E9-1-1 services (which first required street naming and mapping), development of a comprehensive emergency plan for the hurricane-prone islands and the installation of a new trunked communications system.

The Caymans' emergency plan is overseen and implemented by a steering committee of 12 members, each directing one response division. The committee members are responsible for ongoing preparedness training and immediate implementation in case of an emergency. They are also responsible for staying in contact with one another at all times during an emergency, which makes radio communications a critical component of the plan. Telecommunications Director Michael Kiron also oversees the communications committee.

"During preparations for Hurricane Mitch, we realized we needed something to increase the dependability of batteries because in the field, batteries go dead in high-need situations. The Activator chargers would have definitely been helpful then," said Kiron. "We're responsible for the entire communications system and infrastructure for three islands, two radio systems and over 1,000 radios. I have to look at emergency preparedness when we do anything new, as we have to be prepared to respond to any kind of major event, be it a hurricane or other disaster."

Kiron and Cayman Islands Fire Officer Rosworth McLaughlin attended APCO '98 in Albuquerque, NM, to look for ways to improve the Caymans' communications system. Familiar with battery problems, and those that plague firefighters in particular, McLaughlin introduced Kiron to ACT chargers. Since that time, the Caymans' fire, police and telecommunications division have each placed orders for subsequent units, and Kiron recently ordered Personal Activators for each member of the steering committee to assure maximum readiness in the absolute minimum time.

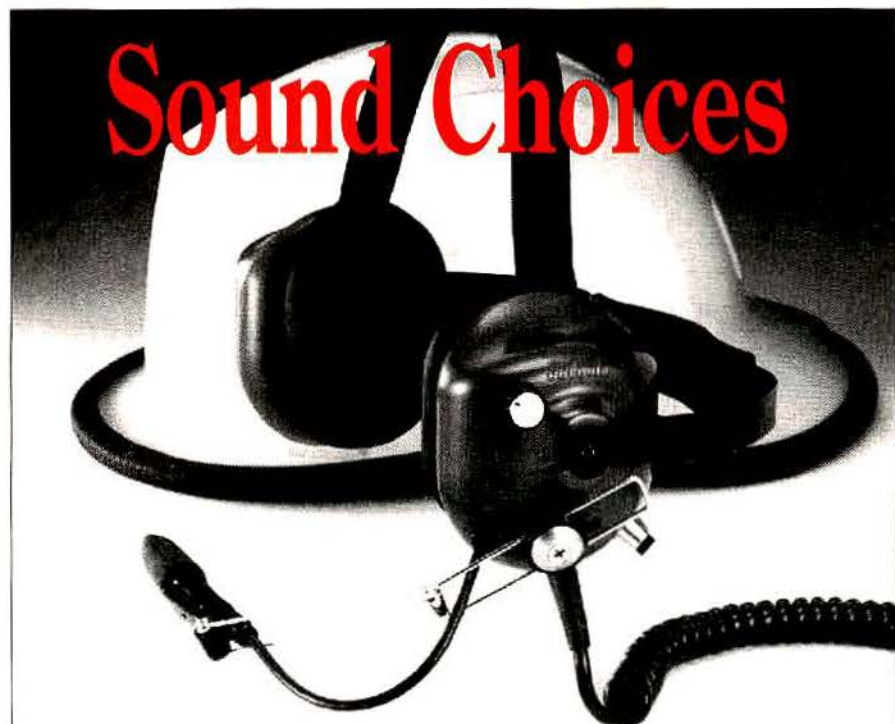
"Our radio system was acquired nearly 10 years ago," Kiron said. "We had so many bad batteries and batteries

that weren't providing the right amount of capacity. After only a short time in service, the Activator charger helped us rejuvenate enough capacity to bring low-capacity batteries up to some pretty high ratings. We were able to recycle more batteries instead of throwing them away and buying new ones. Normally, we must spend about \$1,000-\$2,000 on batteries per month. If we can reduce those costs on a yearly basis, it would be great."

Since the first units were acquired, Cayman Islands police and fire departments have come to appreciate the

chargers for their fast charge times and the dependability of equal capacity between charges. They also liked the fact that it eliminated the need for "managing" batteries between charges. Kiron ordered a variety of adapters for the six-bay charger he placed in the mobile communications unit, so it could be used by multiple departments in the case of an emergency.

The Cayman Islands are in the process of upgrading the existing Motorola trunking system to a digital platform, which will eventually cover departments on all three islands. Kiron will



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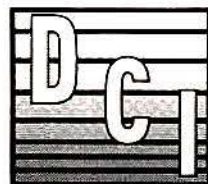
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specify Activator chargers as part of the upgrade.

"Right now, we're using the product to save money," said Kiron. "The more uses for the units, the more applications, the better the return. Even if it didn't save money, it is a great tool for emergency communications. Let's face it, without communications, you can't coordinate an emergency."

The chargers provide multiple uses. They also format new NiCd radio batteries in less than two hours and recharge in about 30 minutes. They save money by conditioning batteries as they charge, extending battery life three to five times, maintaining consistently high capacity for as many as 2,000 cycles, and they eliminate the need for costly and time-consuming battery maintenance programs.

Gulf Coast communications

Ben Holycross knows that no emergency response is better than a well-planned one. Holycross, radio systems manager for Polk County, FL, is a veteran of two hurricane clean-ups who manages communications for more than 20 agencies every day.

Polk County is in the process of installing a new 800MHz trunking system that will unite more than 20 county agencies and will eventually include many local government agencies within the county. As part of the changeover, Polk County, the city of Lakeland and the state of Florida will co-locate on a new radio tower in Lakeland. As part of the plan, the county has also upgraded its backup communications system.

The region's annual "Sun and Fun" event attracts more than 700,000 visitors to Lakeland, a town of 500,000. This year, "Sun and Fun" coincided with the removal of the existing Lakeland radio tower's service, creating a necessary opportunity to test the county's new emergency backup communications system. The backup system features an Aluma Tower trailer that carries an 8 x 8-foot equipment shelter and a 100-foot telescoping tower, and supports a five-channel portable trunking system that can communicate with military frequencies. The backup system also includes primary and secondary mobile communications units and an emergency operations center (EOC), with two six-bay Maintainer charging stations at each location. New radios for the 800MHz system were shipped ahead of schedule to be available for the special event, and preparations included programming radios and charging bat-

teries for all public safety users. (Formatting new batteries took less than two hours with the Maintainers, instead of the usual 16-24 hours.) Holycross considered the "trial run" to be a success.

"I've provided radio communications services after Hurricanes Andrew and Opal," Holycross said. "Whatever I learned from those operations has gone into the planning of Polk County's emergency services program. The pitfall in an emergency situation has always been the failure of backup batteries stored on chargers for long periods of time. After using the Maintainer for six months, we know it can store batteries for that long, and they'll still be dependable in an emergency. Other systems couldn't provide that back up."

"When faced with the need for public safety communications for the 'Sun and Fun' event, as well as the 'fire index' approaching the critical mark, the ability to have and maintain charged batteries to support portable radio operations

'During preparations for Hurricane Mitch, we realized we needed something to increase the dependability of batteries because in the field, batteries go dead in high-need situations.'

is a necessity," Holycross said. "There needs to be a way to charge batteries whenever and wherever they're needed and to have a large number of charged batteries available for emergencies at all times. We've installed six Maintainers each in two containers, so we can take them on site wherever we go with our portable mobile radio system."

Holycross' department fitted the chargers into rolling storage cases for quick portability. Each case holds six, six-bay chargers mounted on a plywood backboard above a six-outlet power strip. The single plug and cord for the strip exits the bottom of the case, so the system can be plugged into a wall outlet while closed. The chargers are designed to keep back-up radio batteries available at all times by providing patented charge and periodic cycling, assuring that fully charged, dependable batteries are available in times of peak need.

The unique Polk County setup enables 36 batteries to be charged and ready for any situation. A fully loaded

case can be unplugged, covered and quickly moved to the necessary location when needed. The case can be plugged back in on location, and the fast chargers can put any radio back into communication in minutes. (The Maintainer charges a 1,200mAh, NiCd, two-way radio battery in 30 minutes.)

Conclusion

Whether you're planning for emergencies or for day-to-day communications, the dependability of a radio system is affected by a variety of complications. From spectrum availability to

antenna placement, from equipment selection to user training, there are many elements required for a smooth-running system. One common denominator is that all radios depend on batteries, and those batteries must be reliable. Chargers that use Enrev technology have finally eliminated the one weak link that has crippled even the most expensive radio systems. The benefits to telecommunications professionals are fewer battery problems, reduced radio complaints, user-friendly charging and the immeasurable benefit of increased user safety. ■

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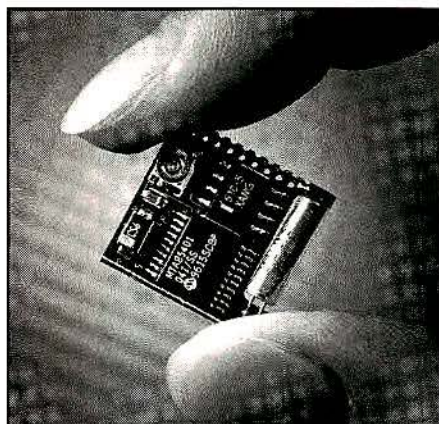
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APCO, the Association of Public-Safety Communications Officials-International, presents the 65th APCO Conference and Exposition. It will take place Aug. 9-13, 1999, in Minneapolis. APCO is the world's oldest and largest non-profit professional organization dedicated to the enhancement of public safety communications.

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Candidate
Thera Bradshaw



Candidate
Lex Rutter

Candidates for second vice president

Thera Bradshaw's public safety communications career spans 26 years. She is the executive director of Regional 9-1-1 Emergency Services in Vancouver, WA, and is responsible for a \$6.3 million operations budget, capital budgets, strategic planning and personnel management of 70 employees and 500 citizen volunteers. The Regional 9-1-1 dispatch center serves 32 public safety agencies. Bradshaw currently serves as the chair of the APCO Operating Procedures and Training Committee and of Project 33, which is intended to establish national training standards. She is a member of the Project 31 Committee (Wireless 9-1-1 Challenges) and chaired the 9-1-1 Committee for four years. She served as president of the Oregon chapter for two terms. Bradshaw also served as NENA president in 1995.

Lex Rutter has 20 years in public safety communications and an additional 13 years in commercial broadcasting. He is chief of the Information and Communications Section of the Tulsa Airport Authority in Tulsa, OK. His responsibilities include communications for the airport's law enforcement, fire, administration and maintenance operations, as well as the associated computer systems. Rutter is a 10-year member of APCO and has been actively involved in the Training and Volunteer Resources committees and the International Task Force. He was also an original member of the Executive Council Management Committee and has lectured at a number of regional and annual APCO conferences during his membership.

Keynote speaker: John Walsh

John Walsh, a well-known advocate for victims' rights and missing children, is the keynote speaker for this year's APCO Conference. He currently hosts the crime-fighting show, "The New America's Most Wanted: America Fights Back."

Walsh and his wife, Reve, became advocates for victims' rights after their six-year-old son Adam was abducted and later found murdered in 1981.

The couple's work led to the passage of the Missing Children Act of 1982 and the Missing Children's Assistance Act of 1984. The latter bill resulted in the founding of the National Center for Missing and Exploited Children, which maintains a toll-free hotline number (1-800-THE-LOST) to report a missing child or the sighting of one. They also founded the Adam Walsh Child Resource Center, a non-profit organization dedicated to legislative reform.

The center recently merged with the National Center for Missing and Exploited Children. Walsh serves on the board of directors of the National Center. The Walsh family tragedy was dramatized in the 1983 NBC TV movie *Adam*, and a 1986 sequel *Adam: His Song Continues*.

APCO Institute pre-con courses

August 6-8, 1999

- ☐ Communications Center Supervisor Course
- ☐ Communications Training Officer (CTO) Course
- ☐ Fire Dispatch Course
- ☐ Liability Issues
- ☐ Customer Service & Team Building
- ☐ EMD Manager Course
- ☐ Survival Spanish for Telecommunications



Conference highlights

Session titles include:

E9-1-1: Value-added location services drive the need for new technologies; Integrated wireless information systems for public safety; Y2K preparedness; GPS/AVL applications for public safety; CALEA; Project 25 advanced technology digital standards update panel; Wireless data in public safety; Impact of FCC Docket 94-102 on PSAP operations; Wireless E9-1-1 phase II technology and related policy.

General information

APCO Pavilion

APCO will sponsor a pavilion in the exhibit hall. If you would like more information on APCO International, stop by the pavilion and talk to staff from APCO headquarters.

You will be able to check and send email from AOL accounts. Non-AOL users will need pop3 mail server domain names or IP addresses, as well as a login name and a password.

MANAPCO Night

The "manufacturers at APCO" reception will be held in the Minneapolis Convention Center Grand Ballroom. The theme is *CampAPCO*, a Northwoods adventure. The event is for all fully registered attendees. The band, The "R" Factor, will be playing music that includes pop, 70s Motown, blues and top 40 hits.

The adventure will feature a live lumberjack show that includes a chainsaw carving demo, log rolling and ax throwing. Buffet selections will include local Minnesota dishes. Non-hosted bars will include beer, wine and sodas.

Audio tapes

Conference sessions will be audio-taped. Only those presenters who have given their consent will have their seminars taped. Audio tapes of the seminars and sessions may be purchased. Order forms will be available at the registration area of the convention center.

Conference agenda

Monday, August 9

7:00 a.m. - 6:00 p.m. Registration Open
8:30 a.m. - 9:15 a.m. New Attendee Orientation
10:00 a.m. - 11:30 a.m. Opening Gen. Session/Featured Speaker/Awards
Noon - 1:30 p.m. Opening Luncheon/Keynote Address & Featured Speakers
1:45 p.m. - 3:15 p.m. FCC Regulatory Panel
1:45 p.m. - 2:45 p.m. Concurrent Sessions
3:00 p.m. - 4:00 p.m. Concurrent Sessions
4:15 p.m. - 5:15 p.m. Concurrent Sessions

Tuesday, August 10

7:00 a.m. - 6:00 p.m. Registration Open
7:30 a.m. - 9:30 a.m. General Business Meeting/Breakfast
10:00 a.m. Grand Opening of Exhibits
10:30 a.m. - 1:30 p.m. Exclusive Exhibit Hours
10:30 a.m. - 5:30 p.m. Exhibits Open
10:30 a.m. - 4:00 p.m. Voting - Second VP (Exhibit Hall)
1:45 p.m. - 2:45 p.m. Concurrent Sessions
3:00 p.m. - 4:00 p.m. Concurrent Sessions
4:15 p.m. - 5:15 p.m. Second General Business Session
6:00 p.m. - 12:00 a.m. MANAPCO Night

Wednesday, August 11

7:00 a.m. - 5:00 p.m. Registration Open
8:00 a.m. - 9:00 a.m. Concurrent Sessions
10:30 a.m. - 1:30 p.m. Exclusive Exhibit Hours

10:30 a.m. - 5:30 p.m. Exhibits Open
10:30 a.m. - 1:30 p.m. Voting - Second VP (Exhibit Hall)
1:45 p.m. - 2:45 p.m. Concurrent Sessions
3:00 p.m. - 4:00 p.m. Concurrent Sessions
4:00 p.m. - 5:30 p.m. Exhibit Hall Activities, Second VP Announcement & Reception/Prize Drawings

Thursday, August 12th

7:00 a.m. - 1:00 p.m. Registration Open
8:00 a.m. - 8:00 p.m. Board of Officers Meeting
8:30 a.m. - 4:00 p.m. Corporate Advisory Committee Meeting
8:00 a.m. - 9:00 a.m. Concurrent Sessions
9:15 a.m. - 10:15 a.m. Concurrent Sessions
10:30 a.m. - 11:30 a.m. Concurrent Sessions
1:00 p.m. - 2:00 p.m. Concurrent Sessions
2:15 p.m. - 3:15 p.m. Concurrent Sessions
6:30 p.m. - 7:30 p.m. Closing Reception
7:30 p.m. - 9:30 p.m. Closing Banquet/Awards
9:30 p.m. - 12:00 a.m. Closing Celebration

Friday, August 13th

7:00 a.m. - 3:00 p.m. 2nd Annual APCO Golf Tournament
10:00 a.m. - 11:30 a.m. Post-Conference Committee & Staff Meeting

Intek, Securicor merger proposal draws lawsuits

Intek Global, New York, and Securicor, United Kingdom, have agreed to merge. Through subsidiaries, Securicor Services and IGC Acquisition Corp., Securicor is offering \$2.75 per share for the 16 million shares of Intek stock that it does not already own. Securicor owns 62% of Intek's stock and has lent the company an estimated \$84 million.

The offer was announced on June 4. Intek accepted it on June 8 at a board meeting. Acceptance was announced on June 10. A class action complaint was filed on June 8, seeking injunctive and other relief relating to the offer. A second and similar class action complaint was filed against Intek on June 15. The lawsuits stem from dissatisfaction on the part of some minority shareholders who believe that a fair offer from Securicor would have valued the shares from \$3.25 to \$10 or more.

After the June 8 board meeting, Intek chairman Robert J. Shiver received a letter

via facsimile from World Team Corp. expressing an interest in "beginning due diligence toward possibly making a more competitive offer" to acquire Intek.

In the letter, World Team describes itself as "a start-up wireless communication venture that is in the advanced arrangements of securing \$250 million via a single equity investor" and whose three founders "have more than 30 years of senior management experience from AT&T, Nextel and McCaw Cellular Communications."

An Intek spokesperson would not comment about the tender offer, any communication with World Team or any current company activities. The spokesperson cited a federal restraint imposed by the Securities and Exchange Commission (SEC) until the tender offer expires July 14 and an additional "quiet period" imposed by the SEC until 30 days after the current FCC auction of 220MHz frequencies in which Intek is participating. *DB*

Otto Engineering buys Sonic Communications

Otto Engineering, Carpentersville, IL, has purchased Sonic Communications, New Ipswich, NH. The Otto and Sonic product lines will combine to provide a broad line of communications accessories. The offering includes a wide range of speaker/mics, earphones, headsets, ear mics, bone conduction mics, motorcycle kits and specialty tactical and surveillance equipment. *MRT*



Cadex Electronics expands, moves into custom-built headquarters



Cadex Electronics has expanded again and moved into custom-built headquarters in Richmond, British

Columbia, Canada.

The new building is characterized with a large glass octagon that serves as the reception area. Engineering and sales are on the second floor with views of the Fraser River and the Alex Fraser Bridge. The proximity of these departments was designed to promote interaction between them. A common lunchroom and lounge area serve as brainstorming places with balconies overlooking the river.

"We truly had the comfort of the employees in mind when we designed the building," said Bill Campbell, director of operations. Special features include shower rooms, snooker table, gym, televisions and a private outdoor patio.

Moving is nothing new to Cadex. Since founder Isidor Buchmann started the company in 1980 from a small room in his residence, Cadex has relocated six times, with each move either doubling or tripling the plant size. *MRT*

Radio transmission pioneer, developer of shortwave equipment dies



Gunther

Frank A. Gunther, 91, one of America's radio transmission pioneers and the original developer of shortwave radio equipment that was the genesis of today's wireless transmission industry, died on May 24, 1999, in Venice, FL. A fellow in the Institute of Electrical & Electronics Engineers (IEEE), Gunther's 72-year career in radio transmission included installing the 600m transmitter-receiver in the sea plane used by Amelia Earhart in

1928. He also toured Vietnam as a three-star lieutenant general at the request of U.S. Army Signal to inspect various communications installations in the country.

Gunther installed and proved the viability of wireless communications during an age and time when few envisioned the potential and impact wireless communications would have on our lifestyles and on the lives that could be saved through its use in emergency alert systems.

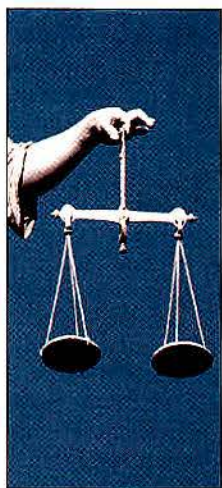
Gunther worked with Edwin H. Armstrong in October 1935 to operate the receiving equipment for Armstrong's first public demonstra-

tion of FM. The following year, Gunther designed and manufactured the early transmitter components for Armstrong's wideband FM system. Gunther proved the viability of and installed two-way mobile radio systems for major cities. These installations grew out of Gunther's securing a FCC license for the world's first two-way mobile radio systems for the city of Bayonne, NJ.

An early member and past president of the Radio Club of American, he was honored with the establishment of the Frank A. Gunther Award by the club in 1996. *MRT*

DOJ to modify Nextel decree

The U.S. Justice Department (DOJ) has tentatively agreed to modify a consent decree that restricts the number of channels of 900MHz frequencies that may be controlled by



Nextel Communications, McLean, VA, and Motorola, Schaumburg, IL. The proposed modification, if approved by a court, would bar Nextel from acquiring the large block of spectrum that will be sold in Geotek Communications' bankruptcy proceedings, but it would

also permit Nextel and Motorola to increase their collective holdings of spectrum.

The 1995 consent decree resolved an antitrust case, brought by the Justice Department alleging that the merger of Nextel's and Motorola's dispatch service business would have reduced competition. It allowed the merger to proceed while limiting the companies' holdings of 900MHz spectrum to 30 channels in 12 cities and to 10 channels in Detroit and Seattle. The limits were intended to provide opportunities for competing providers of dispatch services to acquire spectrum.

In February of this year, Nextel filed a motion requesting immediate termination of the consent decree so it could acquire the Geotek licenses and other 900MHz spectrum. The DOJ opposed Nextel's motion after finding that if the decree were to remain in effect, the Geotek licenses would likely be acquired and used by a new competitor.

While barring Nextel from acquiring the 900MHz licenses held by Geotek, the proposed modification would allow Nextel and Motorola to hold or acquire as many as 108 channels of 900MHz spectrum in 12 cities and as many as 54 channels of 900MHz spectrum in Seattle and Detroit. The new limits would expire on Oct. 31, 2000. The DOJ stated that termination of the decree in October 2000 appeared to be appropriate in

Continued on page 66

FCC Notes

Commission modifies trunking rules

The FCC has decided to modify the rules governing centralized trunking below 800MHz. This Memorandum Opinion and Order addressed the following issues: It adopted new standards for when consent must be obtained from certain existing licenses when applications are filed for trunked operation on shared spectrum below 800MHz; It mandates that certified PLMR frequency coordinators evaluate trunking proposals on shared spectrum, reserving to the FCC the right to resolve contested proposals; It established procedures for the processing of trunking proposals on shared spectrum intended to guard against submission of speculative applications; It affirmed that a trunking proponent must obtain consent from all affected co-channel and adjacent channel licensees before filing and application for trunked operation; Finally, it imposed a ten-channel limit on the number of channels that may be requested in an initial trunking application, but gives the public safety entities the flexibility to exceed that limit based on a show of need.

FCC changes antenna registration procedure

The WTB has adopted a new filing system for antenna structure registration (ASR) that will affect both electronic and manual ASR filings. This will also include the release of a revised FCC Form 854. The main changes involve both manual and electronic filings. Internet and expanded search features will be available and TIN (taxpayer identification number) registration will be required of all filers.

The new ASR software has been developed in conjunction with WTB's universal licensing system (ULS). The new ASR system will provide fast and easy electronic filing, improved data accuracy through automated checking of applications and enhanced electronic access to registration information.

Free electronic filing and database searches will be available over the Internet, replacing outdated filing software and fee-based searches of the ASR database. All filers must register their TIN with the commission and list their current antenna structure registrations prior to submitting both paper and electronic ASR applications.

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—Nextel decree

Continued from page 65

light of expected entry into the dispatch business in the future by firms using 220MHz and by cellular or PCS providers.

The Alliance for Radio Competition (ARC) responded by issuing a "call to arms" against the proposed agreement. Representing more than 40 SMR companies, ARC said that the agreement would further undermine competition. ARC is calling upon SMR companies and their customers to express their concerns that competition would not be fostered by the DOJ-Nextel proposal. ARC is seeking both comments on how businesses would be affected and is urging any interested dispatch operators to join its fight against the tentative settlement agreement.

John Reardon, ARC director, said, "Ultimately, it is the American consumers who will lose. In markets where Nextel already dominates the airwaves, critical dispatch customers have experienced tremendous cost increases, and we want to present important documentation during the mandatory public comment period."

One SMR company in particular, Mobex Communications, Lafayette, CA, also responded to the proposal. Mobex said that competition within the dispatch radio industry would be severely hurt if the modifications were allowed to take effect. Mobex called the proposal a "midnight agreement" between Nextel and the DOJ, which if approved, would strip away the pro-competitive provisions of the consent decree five years earlier than planned.

Frank Casazza, Mobex's president, said, "This battle is far from over. Mobex Communications will continue to do everything possible to preserve competition within the SMR industry. We believe that some of the reasoning behind the agreement is seriously flawed, and we plan to shed more light on the matter during the public comment period."

According to Mobex, the proposed order blurred the lines on how much spectrum one company could hold before a monopoly is created. If approved, the modifications would give Nextel the right to own 90% of the SMR licenses in any one market. Major markets are allocated 200 channels in the 900MHz band, of which 60 to 70 are used for paging

and data. The modification would allow Nextel to own 108 channels, leaving just 22 channels for competitors. Nextel already dominates the 800MHz SMR band.

"We do applaud the provision that bars Nextel from purchasing the Geotek licenses in the 14 cities covered by the original consent decree. However, that provision expires with the order in October 2000, and there is nothing to prevent Nextel from asking bankruptcy trustees to hold the licenses for the next 16 months," Casazza said.

Mobex also said it plans to pursue a motion the company filed on February 17 asking for the DOJ to enforce the original decree. In its filing, Mobex said public records showed that Nextel may have never totally complied with that decree and may have violated it repeatedly since it was signed three years ago. Mobex said it believed Nextel had reaped "huge" benefits from the original consent decree and now wanted to change it, refusing to honor its commitments.

"In markets where Nextel is the dominant SMR provider, its customers suffer a 200% to 300% price increase when Nextel turns on its digital system and shuts down its analog system. There is no disputing that fact, which clearly illustrates the customer benefits of competition," Casazza said.

Nextel Chairman Dan Akerson said that the agreement would bring clarity to Nextel's business strategy and development. "This settlement affords us a two-fold benefit. First, there is certainty as to when the consent decree will end; and second, we will be free to acquire more than 2.5MHz in each of the larger consent markets, more than tripling our 900MHz position in each of those markets. This will allow Nextel to assemble a critical mass of 900MHz channels that will facilitate expansion and capital efficiency in the deployment of our IDEN network."

A notice of Nextel's motion to modify the consent decree and the DOJ's tentative consent to the modification will be published in the Federal Register. Any person may comment on the proposed modifications by submitting comments to Donald J. Russell, Chief, Telecommunications Task Force, Antitrust Division, U.S. Department of Justice. *MRT*

News Notes

May 18, **Conexus Communications**, Greenville, SC, and several of its related companies filed for protection from creditors under Chapter 11 of the U.S. Bankruptcy Code. Among its creditors is Charlotte, NC-based **Glenayre Technologies**, which is owed \$49 million. ... On June 4, **Arch Communications Group**, Westborough, MA, and **Mobile-Media**, Fort Lee, NJ, completed their merger. The combination is the nation's second-largest paging and wireless messaging company with more than 7 million units in service in 50 states. ... **Andrew**, Orland Park, IL, has won a contract from **Amelco Electric SF** to supply a trunked radio system for communications in the San Francisco **Bay Area Rapid Transit District (BART)** airport extension project. Andrew will supply, start up, and test the backbone radio communications system that Amelco will install in the two BART airport extension tunnels.

The Decibel Products Division of **Allen Telecom**, Beachwood, OH, has been awarded a \$6.6 million contract to supply the largest cellular operator in China, **China Telecom**, with key components to expand existing GSM wireless communications systems.

ComSpace, Irving, TX, has closed a \$16.4 million round of financing led by **Rho Management** and including new investors **Hunt Financial**, Dallas; **Broadband Venture Partners**, Dallas; and **Noro-Moseley Partners**, Atlanta.

CML Technologies, Hull, Quebec, and **Integrated Data Solutions**, Bainbridge Island, WA, will pursue business operations in the public safety location technology sector jointly. An agreement between the two companies guides the development of a selective router product required for Phase II routing to public safety answering points.

Transcrypt International, Lincoln, NE, has sold its 76,000-square-foot Lincoln facility for \$5.2 million to National Bank of Commerce Trust and Savings Association. The new owner will occupy 33,000 square feet. Transcrypt has leased 43,000 square feet for five years.

The company's EFJohnson Division has won a \$2.9 million contract from Pima County, AZ, for a three-site 800MHz trunked radio system equipped to handle 1,100 portable and mobile radios for the sheriff's office.

Logging and recording systems

Voice recorder offers DVD archiving

Advantage digital voice recording systems from ATIS feature voice clarity, ease-of-use, and a full range of archiving options including DVD. The units are local and wide-area network ready and offer instant message recall from any connected station. Sound-quality voice compression options enable up to 3000 hours per DVD. Simultaneous file search and retrieval is possible across eight audio channels. The "save tape" recovery function enables damaged archive tapes or

disks to be rebuilt. The units offer unlimited expansion. Desktop and 19" standard rackmount models can be added in 128 channel subsystem increments.

Circle (351) on Fast Fact Card

Voice recording server features real-time operating system



Mirra voice recording server from **Racal Recorders** features a real-time operating system, VX-Works, which is the technology that put Path-

finder on Mars. The optical, rewriteable disks are capable of more than 1,000 rewrite operations. Speech is processed using 8kbps ACELP, giving an 8:1 compression ratio. One disk can store 170 channel hours, making the recorder capable of having 340 channel hours available for fast access (via two drives). Because no hard drive is used in the recorder, it is capable of quick power up and power down. It does not rely on a disk-based operating system, so the recorder is online within 15 seconds, offering resilient recording.

Circle (352) on Fast Fact Card

Recorder uses 200kHz sample rate

Astro-Med has developed a 16-channel data acquisition field recorder, equipped with universal inputs that accept isolated single-ended and differential voltages, thermocouples, pressure transducers and load cells. The unit eliminates the need for signal conditioning or front-end filtering. With the system's sample rate of 0.2kHz-200kHz, it can perform applications ranging from process trending to transient capture.

Circle (353) on Fast Fact Card

Recorder uses unified platform

Dictaphone's da Vinci recording system provides built-in quality assurance tools and state-of-the-art call archiving and retrieval features in a unified platform. The design enables public safety operators to monitor and evaluate routinely for quality assurance and to record and quickly retrieve their voice conversations and CAD data screens for a complete record of incident-handling. Da Vinci CAS (call archiving system) is a call-recording and retrieval system that gives public safety operators a faster way to investigate incidents and resolve complaints. It uses a "computer telephony intelligent" design to collect data from the facility's telephone, computer and radio systems to store with voice recordings.

Circle (354) on Fast Fact Card



Digital voice recorder provides instant access to stored data

JEI's digital voice recorder, model DVR-8, records telephone and two-way radio communications to avoid litigation, to comply with legislation or to improve customer service. Instant access to 130 hours of recordings is provided by the internal hard drive. DAT cartridges that hold 200 hours of conversation provide the removable archival storage. Other features include: voice-activated recording to avoid wasting storage media; simultaneous record and playback so a conversation is not missed; and a 5" monitor for viewing information on 18 recordings at one time. The DVR-8 will connect to a Novell or NT computer network.

Circle (355) on Fast Fact Card



Voice tracker records, plays back all two-way communications



Record/Play Tek's Voice Tracker VT7700 can record two-way communications and play them back on a PC. It is compatible with any telephone system, digital or analog, and it can be used to

record from a telephone, telephone line or two-way radio. It is easily installed as a background program and has multichannel capability. It provides weeks of recording capability with instant recall. It features a vox recording system, which provides minimum storage requirements.

Circle (356) on Fast Fact Card

READERS' CHOICE

Of the new products in the January 1999 issue, this one generated the biggest reader response. For more information on this product, circle the corresponding Fast Fact Card number on the card found in the back of this issue, and mail the card to us.

Trunking boards support Motorola radios



IDA's LTR trunking option boards for the Motorola P1225 hand-held radio and the M1225 mobile radio are available for all 1225 UHF and VHF models. The new release is in addition to the LTR conversion kits that IDA offers for Motorola models in the 400MHz, 800MHz and 900MHz bands. The LTR option board includes such features as scan, TX time-out timer, transpond, trunked or conventional operation, narrowband, wideband, CTCSS and CDCSS, block encode/

decode, individual aliasing and automatic channel acquisition. As many as 16 systems and 16 groups per system are available, depending on the radio model. Option boards supporting the advanced trunking protocol LTR-Net are under development.

Circle (500) on Fast Fact Card

Headsets provide comfort for extended wear



The Breeze headsets from Otto Communications provide clear, discrete two-way radio communications while offering the additional comfort necessary for extended wear. Compatible with a variety of radio makes and models, the headset is suitable for continuous use. The headset features a lightweight frame for superior comfort and fit, a flexible, electret boom-mic and a remote or in-line PTT switch.

Circle (401) on Fast Fact Card

Unit operates on LTR or conventional systems

Linkplus from South Plains Communications was designed to operate on LTR trunking systems. It will also work on most conventional systems if the appropriate tone panel is used. The link is programmed to continuously check the status of the radios. If, for any reason, a radio falls out of sync or out of the programming mode, the radios will automatically reset. As a security measure, the link resets itself every 30 minutes when there has been no activity on the system. The LA68000 series microprocessor is used to read the information coming from the radio's CPU and going to the display unit, therefore, no programming of the link is involved.



Only the radios are programmed, the unit is not. Programming of the radios is critical. They must be programmed identically or the unit will not function. Only the information on the alphanumeric display is used by the unit for control purposes.

Circle (402) on Fast Fact Card

Repeaters enhance communication systems



The VXR-1000 series of vehicular repeaters from Vertex Radio Communications is designed to enhance public safety and industrial communications systems. The multichannel crossband vehicular repeater provides portable coverage throughout the system without the addition of site equipment. The repeater allows coverage using the high output power of the mobiles. Small in size, and with true plug-and-play capability, the repeater will interface with most brands of mobile radios. The frequency range is 150MHz-174MHz and 45MHz-470MHz. It has a 16-channel capacity and 5W power output (selectable 2.5mW, 1mW and 500mW power levels). The bandwidth is 12.5kHz/25kHz and features CTCSS/DCS encode and decode.

Circle (403) on Fast Fact Card

Software for Motorola trunked systems

Computer Resources' Motorola Radio Integrated Site Management (MR-ISM) is an integrated system for Motorola trunked systems. MR-ISM integrates the Motorola radio ID assignment (MR-IDA), Motorola site maintenance (MSM) and mobile radio billing (MRB) into a single operation. This process allows the operator to create and to manipulate IDs for fleet, sub-fleet and talk groups for Type II (hybrid) radios, along with normal Type I and Type II personalities. Once created, standard files can be "handed" to Motorola's RSS for radio programming. From ID assignment, MR-ISM will insert the radios into the billing process. This allows the operator to select the billing parameters of the units from interconnect to long distance, to dispatch billing with a wide variety of options.

Circle (404) on Fast Fact Card

Probe tests all incoming signals



The Wandel & Goltermann Type 25 shaped probe from Chase Systems operates with the EMR-200 and EMR-300 W&G meters and complements a full

range of both electric and magnetic probes operating from 3kHz to 60GHz. The probe measures in the frequency range of 300kHz to 18GHz and provides a percentage display corresponding to the FCC maximum permissible exposure limits (MPE) for communications workers. The new probe is isotropic, evaluates all incoming signals according to their frequency delinquent limit values and can be calibrated to other national standards such as Canadian Code 6. For complex transmission sites, the measurement range is as much as 300% of standard and as high as 900% in single-source environments.

Circle (405) on Fast Fact Card

Transmitter tests indoor coverage



The Iguana from Berkeley Varitronics Systems is a 1W stimulus transmitter used for indoor coverage testing. The transmitter is suitable for LAN setup and evaluating network performance. It is available as a CW transmitter or on certain models with digital modulation. In a typical application, one or more transmitters are placed throughout an entire area of interest and set to transmit on different channels. Measuring and recording field strength is then done by using portable strength meters.

Circle (406) on Fast Fact Card

One-piece entry boot simplifies installation



Andrew's one-piece cable-entry boot has a self-aligning seam for installation and weather resistance of equipment shelter feed-through plates. The one-piece boots are available for 4" or 5" entry plate holes with cushions that accommodate Heliac and other coaxial cables from 1/4" to 3". The seam fits

snugly against the entry plate, and because two pieces do not have to be aligned, the seal offers weather resistance. Clamping with stainless steel hose clamps completes installation. The entry boots and cable cushions are made from black EPDM rubber for weather resistance. The boots have been tested to meet MIL-STD specifications for thermal shock, humidity and moisture resistance, icing and vibration.

Circle (407) on Fast Fact Card

Surge protectors suitable for broadband apps

Citel's coaxial surge protectors for wireless systems, microwaves, radios, antennas, GPS and satellite systems provide fast-acting protection against lightning surges and electrical transients. The surge suppressors use gas tube technology that makes them usable for broadband applications. Many connectors are offered: N, BNC, TNC, SMA and 7/16. The P8AX coaxial protectors are available for any

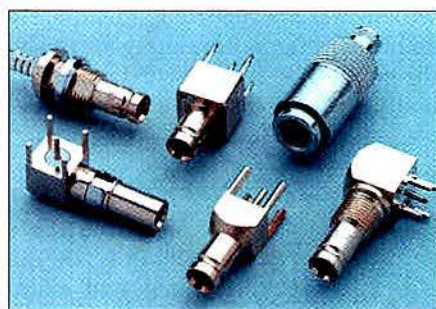
power from 1W to 1,000W and any frequency from dc to 10GHz. They feature low VSWR and insertion loss. Grounding can be done either through an external ground screw or through a bulkhead mount. The connectors' compact size makes them easy to install. They mount as a cable assembly or through the chassis of the equipment to be protected.

Circle (408) on Fast Fact Card

Compact coaxial connectors suit limited space

Amphenol's Communication and Network Products division's 1.0/2.3 coaxial connectors are designed with threaded coupling mechanisms that provide positive mating. The products are also available with a push-pull coupling system that allows quick installation. The connectors are compact to permit dense connector packing; they are suited for applications where space is limited.

Circle (409) on Fast Fact Card



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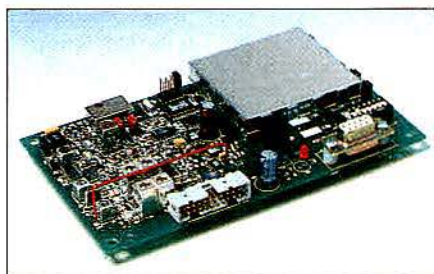
Console incorporates Vertex radios, controller

Nida Companies' portable communications console model NC-11-PTR-X011-4 incorporates two Vertex four-channel radios and Nida's RC-200 repeater-link controller to form either an in-band or crossband portable repeater. The console comes standard with antennas. An internal 25Ah sealed lead-acid battery is optional, as are a 20A charger and power supply and magnetic mount antennas. With the internal battery, the unit

charges in four to six hours and can be trickle-charged when connected to a vehicle's 13.8Vdc power source. The configuration has been designed to provide the communications officer the ability to cross-connect radio systems for interagency operations on short notice. The PC programmability of the Vertex radios enable the officer to change the features and abilities of the radios as needs change.

Circle (410) on Fast Fact Card

Paging receivers provide remote control



Sonik Technologies' Pagelink series of paging data receivers are suitable for providing remote control and one-way telemetry using existing paging infrastructure or on-premises paging equipment. The Pagelink 150 and Pagelink 450 are for the standard POCSAG signaling format and operate in the 150MHz and 450MHz ranges. The series provides eight addressable CMOS output lines and an RS-232, 1,200bps serial output. The receivers are synthesized and can be factory-programmed for four channels within their frequency bands. Any one of those channels can be field-selected by jumper. The capcode address of each unit can also be conveniently set in the field by on-board DIP switches.

Circle (413) on Fast Fact Card

Alarm monitors eight digital, analog inputs

Decibel Products' dB Alarm Dialer, model DB8815A, accepts as many as eight digital or analog inputs and offers two relay output alarms. Users can select multiple analog sensing inputs from 0Vdc to 5Vdc or select digital closed-contact relay inputs. The alarm uses a standard PC modem to report each alarm occurrence to as many as four locations, including numeric and alphanumeric pagers and remote computers. These alarms can be prioritized to specify which ones are reported immediately and which alarms are simply logged by the monitor. Predefined text messages notify repair personnel with an alarm de-

scription and assign them a major or minor alarm status. Designed for stand-alone or 1U high-rack use, the alarm can connect to SCADA systems through the RS-232 interface or via a telephone line. This unit is also suited for such simple monitoring tasks as temperature, contact closures, tower lights, water levels, ac power, transmitter power and other applications needing remote alarm notification.



Circle (411) on Fast Fact Card

Radio modem performs in narrowband channels



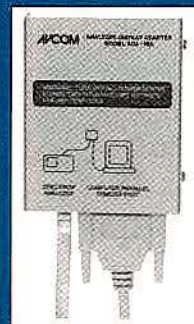
Dataradio's Mobilpac is an integrated radio and modem package. The modem combines a dedi-

cated data-only mobile radio and new-generation Dataradio MRM (mobile radio modem) to provide data performance in narrowband radio channels. Featuring DSP, the modem

brings 19.2kbps operation to 25kHz channels without the coverage penalties experienced with other systems. Models 9600 and 4800 are available for backward compatibility with existing Dataradio systems. The 19.2kbps and 9,600bps models use DBA over-the-air protocol with built-in vehicle tracking and long message features to enhance throughput.

Circle (412) on Fast Fact Card

Adapter enables trace of signals



AVCOM of Virginia's analyzer display adapter, model ADA-10A, is designed for use with the AVCOM portable spectrum analyzer, including the PSA-33A, the

PSA-37D and the PSA-65C. The adapter enables an IBM-compatible PC to record the trace of the signals as seen on the CRT of the spectrum analyzer. The adapter program will store in the computer file the associated settings (center frequency, span, reference level and sweep rate) as entered by the operator and resulting figures (start and stop frequencies, total span and resolution bandwidth). The adapter consists of the hardware to send signal data from the spectrum analyzer to the PC via the printer port and includes software to recreate the signal trace.

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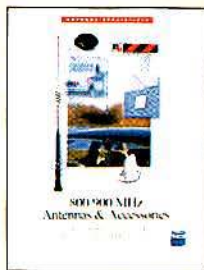
The new RF Industries product line of nearly 4,000 stock cable assemblies features the RF Connectors line of high quality coaxial connectors, soldered center contacts, dual-wall tubing for strain relief and fabrication using only US manufactured coaxial cables. More than 650 variations of standard connector interfaces terminate thirty+ popular coaxial cable types to create this broad selection. Custom assemblies are available with short lead times. RF Connectors Distributors are located throughout the US, Canada and Mexico.



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Catalog offers trunking antennas



The 1999 edition of the *800/900MHz Antennas & Accessories* catalog from **Antenna Specialists** features the latest SMR, GSM, ISM, spread-spectrum and wireless data trunking antennas and accessories. The 28-page catalog updates all mobile, portable, dual-band, fixed-station and wireless data antennas and special-purpose repeaters for the 800MHz-900MHz frequency range.

Circle (451) on Fast Fact Card

Catalog features power products

The 1999/2000 editions of the *System Power Products Selection Guide* and *Power Products Catalog* from **Hewlett-Packard** highlight key features and specifications of HP's power products and contains a succinct overview of the HP power-product line, including mobile communications CD sources, ac power source/analyzers, regulatory test solutions, dc power supplies, dc electronic loads, solar-array simulators and modular power systems. The catalogs are also available on-line at www.hp.com/go/power3.

Circle (452) on Fast Fact Card

Internet connectivity methods offer more Web access options

Internet Paging Gateway, a TNPP router with Internet gateway, and custom Web pages for Internet access from **Hark Systems** provide Internet connectivity for any paging system operator and its customers and are now available for resellers and carriers. The Internet paging gateway allows paging operators to exchange paging traffic between the Internet and a TNPP network. Carriers or resellers can have an Internet presence for delivery of alphanumeric paging traffic. Selected paging traffic can be sent to an email address.

Circle (453) on Fast Fact Card

Web site lists catalog on-line

Jameco Electronics has released a new catalog and an updated Web site. The catalog features thousands of ICs, components, tools, test equipment and computer products for OEMs, engineers, educators and service and repair technicians. More than 215 products have been added, including new lines of test equipment, semiconductors, 3M anti-static equipment and industrial analog meters. The on-line version of the catalog is available at www.jameco.com. It features a quicker ordering process from a secure commerce Web server.

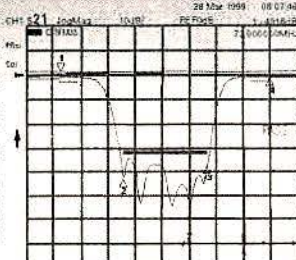
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people



Banos



Miller



Tewel



Spreen

Joe Banos, president of Neulink Division of RF Industries, San Diego, exits to become president and general manager of Ranger Communications, San Diego.

Alan Miller leaves Motorola's Government Markets Division, New York, as district sales manager to join Leo Mac 2-Way Radio Service, East Syracuse, NY, as corporate sales and marketing manager.

Dave Tewel departs Telect, Spokane, WA, as manager of systems engineering to join Winsted, Minneapolis, as western regional sales manager.

Scott Spreen joins NEC America's Wireless Marketing Division, Irving, TX, as account executive after working in business development with Siemens, headquartered in Germany.

Wayne Nelson joins Aerotron-Repcos Systems, Orlando, FL, as general manager after 20 years of experience in the land mobile, telemetry and cellular radio markets.

Changes to the Personal Communications Industry Association's board of directors:

George Schmitt, president of Omnipoint Communications, Bethesda, MD, succeeds **William Collins**, chairman of Metrocall, Alexandria, VA. **Gary Cuccio**, president of AirTouch Paging, Dallas, joins the executive committee as vice chairman. **Eric Ensor**, president of TWS, Alpharetta, GA, joins as treasurer. and **Ed Baker Jr.**, chairman of the Arch Communications Group, Westboro, MA, is elected secretary.

E. Blake Hawk, a partner with Brown, Parker & Leahy, Houston, exits to become executive vice president of Crown Castle International, Houston.

Reed E. Hundt, former chairman of the FCC, is elected to Redwood City-based Phone.com's board of directors. Hundt is a senior advisor on information industries to McKinsey & Company, New York, and a principal of Charles Ross Partners, Bethesda, MD.

Don Sweeney departs TDI, Downers Grove, IL, as director of manufacturing and procurement to join JBRO Batteries, Lisle, IL, as vice president of operations.

Karina Graham, assistant manager of customer support at National Dispatch Center, San Diego, advances to manager of inside sales.

Changes at Boonton Electronics, Parsippany, NJ:

Ron Zukowski leaves Phillips/Lucent Technologies New Product Introduction Center, Whippany, NJ, as manufacturing manager to join Boonton as director of operations. **Robert Hannon** departs Artisan Controls, Parsippany, as treasurer to become chief financial officer at Boonton.

MRT



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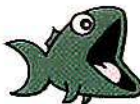


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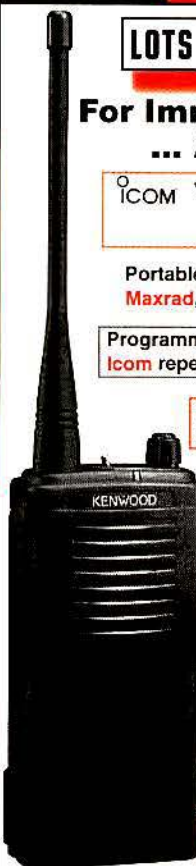
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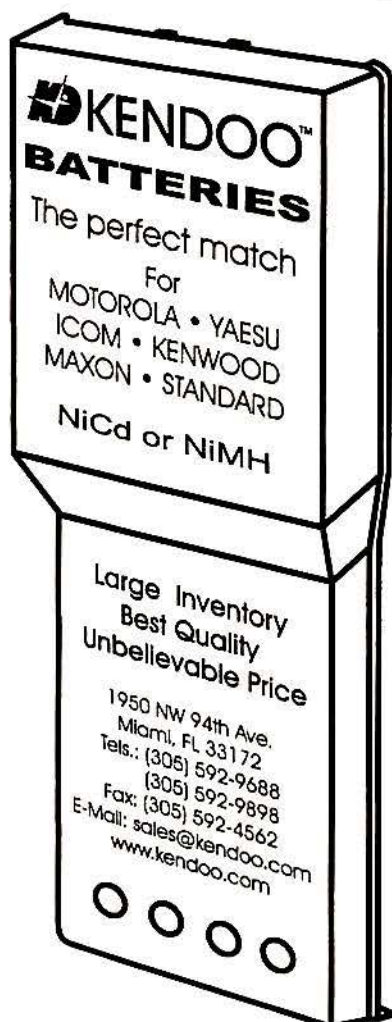
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05	Motorola MR-600 Non-stubby loop radios 6ghz 300ch	\$1000 ea.
40	Motorola Mitrek 30-39 PL (SYS-90 Acc) 110w	\$175 ea.
50	Motorola Starplex Term Cards MLN6288	\$80 ea.
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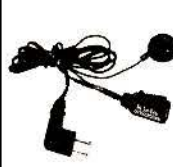
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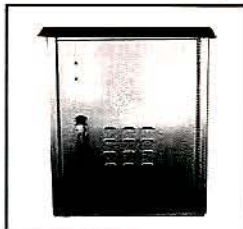
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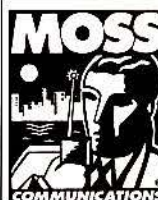
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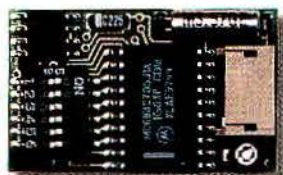


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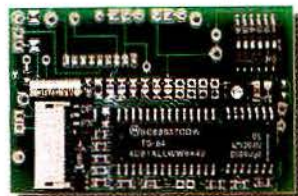
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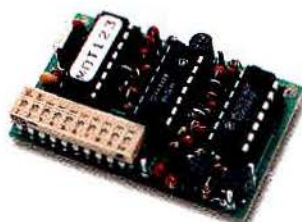
ID-8 \$69.95
Automatic Morse Station Identifier. Meets all FCC
ID Requirements. Fully field programmable
with included keypad. 1.85" x 1.12" x .35"



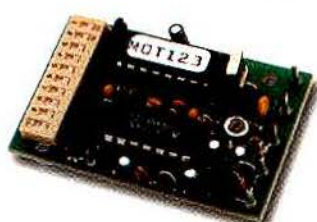
TP-3200 \$279.95
Full Featured Shared Repeater Tone Panel with ALL 157
CTCSS/DCS codes. In Desktop or Rack Mount versions.



PE-1000 \$224.95
Desktop Paging Encoder. Two-Tone Sequential,
other formats available. 7.5" x 7.8" x 2.7"



SD-1000 \$59.95
Two-Tone Sequential Decoder. Programmable unit
provides switched outputs from Two-Tone paging calls.
1.25" x 2.0" x .4"



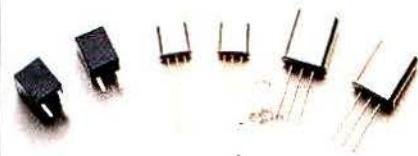
PE-2P \$54.95
Two-Tone Sequential Encoder. Sub-assembly mounts
inside radio or other enclosure. Multiple call capability.
1.25" x 2.0" x .4"



DCS-23 \$59.95
Digital Coded Squelch Encoder-Decoder. Programmable
to all 106 DCS codes. 1.36" x 1.18" x .25"



TE-64D \$129.90
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